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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

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SUMMARY OF RECENT ABSTRACTS.*

III. MALARIA.

Epidemiology and Distribution.

HACKETT (p. 998) writes of the value of spleen surveys in malaria; they revealed areas of endemic malaria in Italy and Albania, and are of the greatest value in estimating the results of control measures and in comparing malaria intensity in different places. But spleen surveys should not rule out blood examination, and where the two are performed, they should be done on the same persons. He advocates a method of spleen assessment in which numbers from 1 to 5 are given, according to size. The size of the "average enlarged spleen" is significant; it tends to be higher the longer the transmission season.

MAZZEO and SEMENTINI (p. 352) report on malaria in part of the Province of Naples, PETAZZI (p. 353) on malaria at Durazzo, COLUZZI (p. 353) on malaria at Valona and in Epirus. These papers are of local interest.

PARADE (p. 820) reports two cases in which infection was apparently contracted at Innsbruck, Austria.

LINDBERG (p. 637) gives an account of malaria in Iran, about which little has previously been published. In the Caspian provinces *Anopheles* are not found over 2,000 metres, but in the mountain valleys malaria is common in the summer months. *A. superpictus* is the probable vector there, but *A. maculipennis* and *A. elutus* are suspected elsewhere. Several other species are reported from different areas. All the three common forms of malaria are seen, but distribution over the country is patchy. ZADÈH (p. 638) also gives information on malaria and *Anopheles* of Iran.

ZUMPT and MINNING (p. 4) report on malaria in Southern Russia during the German occupation; there is nothing unusual in the information given. PLATONOV (p. 636) notes that *P. falciparum* infection is endemic in south-west Siberia, in the flood plain of the river Obi.

WILSON and NOTLEY (p. 90) report on malaria in Southern Somalia (formerly Italian Somaliland). The vector is *A. gambiae*, which breeds in irrigation water, flood water, rain water, or pools in permanent rivers. The transmission season is usually short, and the disease mostly epidemic. In places with a very short season the spleen rates tended to be higher in adults than in children; with a

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1944, v. 41. References to the abstracts are given under the names of the authors quoted, and the page on which the abstracts are printed.

rather longer season the rates were equal, but the size of the spleen increased with age; with a still longer season the rates were equal or decreased with age, and the size of the spleen was similar at all ages.

LAOUILHEAU (p. 999) found a spleen rate of 40 per cent. in Libreville, Gabon, at the beginning of the dry season; infections with *P. falciparum* were rather more numerous than those with *P. vivax*.

SARMENTO (p. 997) discusses the epidemiology of malaria in Camacupa (Angola), a hyperendemic area in which *P. falciparum* is the commonest parasite.

SIVALINGHAM (p. 718) gives the results of a survey of spleen and parasite rates in Ceylon after a severe epidemic of malaria had affected the wet and intermediate zones of the island. *P. malariae* was the commonest parasite of all zones.

YAO (p. 88) refers to the incidence of malaria in China; in the low-lying region it is mild, and *P. vivax* predominates, but in the south-western provinces, especially along the borders of Indo-China, Thailand and Burma, the common infection is with *P. falciparum*. In 1939, thousands of workmen died of subtertian malaria on the Yunnan-Burma highway. A list of *Anopheles* of Free China is given—*A. minimus* is the chief vector in the south-west, but *A. jeyporiensis candidiensis* is also important. YAO *et al.* (p. 999) report on a malaria survey of the south-west terminus of the Yunnan-Burma highway, where *A. minimus* is the chief vector (though *A. hyrcanus sinensis* and *A. jeyporiensis candidiensis* have been found infected). *P. falciparum* is the commonest parasite. The heavy malaria season is the last quarter of the year. YU and YING (p. 89) also write of the severe endemic malaria of Yunnan. In a description of a series of patients they emphasize the protean manifestations of the disease. In obscure cases sternal puncture and the ephedrine provocative test have been found useful. WINTERBOTTOM and ARDEN (p. 255) report malaria in Brisbane, Australia, which is much farther south than the limits of any recorded outbreak since 1900. It seems likely that the patients were infected by *Anopheles* which had themselves picked up infection from soldiers returned from malarious war areas; *Anopheles annulipes*, a proved vector, exists as far south as Tasmania.

FAUST (pp. 91, 998) shows that the steady decline in malaria mortality and morbidity in the United States has continued through the years 1941 and 1942. Figures are given for the various States.

DOWNS *et al.* (p. 445) have provided a comprehensive report on malaria in Trinidad and Tobago, where the population has been greatly increased on account of war-time activity. Malaria causes as many deaths as pulmonary tuberculosis, and many more than enteric fever, according to published figures. About 83 per cent. of diagnosed infections were due to *P. falciparum* in the period concerned. The spleen rate in children varies from 3·4 to 53·1 per cent., and the parasite rate varies directly with the spleen rate. Of the 13 *Anopheles* found, two are vectors—*A. aquasalis* which breeds in coastal brackish water, and *A. bellator* which breeds in bromeliads parasitic on the shade trees of cocoa plantations. It is noted that about half the area of Trinidad is free from malaria.

SCHIAVI, DE MELO and CÔDA (p. 915) report cases of quartan malaria from the State of São Paulo, Brazil.

ALBERTO ALVARADO (p. 638) gives an account of malaria in Argentina, in which he shows that even *P. falciparum* infections are relatively mild.

Aetiology.

SHUTE (p. 255) has succeeded in producing human infection with sporozoites of *P. falciparum*, *P. vivax* and *P. ovale*, which had not been in contact with the salivary glands of the mosquito, but were present in ripe oöcysts. There had previously been controversy as to whether or not this was possible.

ANGELINI (p. 181) has found malaria parasites in normoblasts; the invasion of immature erythrocytes is rare, and is seen only in heavy infections.

MATILLA and APARICIO (p. 530) claim to have found extracellular malaria parasites constantly in the bone marrow of patients undergoing malaria therapy.

SCHWETZ (p. 529) discusses the morphological variations seen in *P. falciparum*, which in the past have led to suggestions that different species exist. He, however, relates these differences to the various degrees of immunity in the patients, or to changes produced in the preparation of blood slides. The presence of numerous very young rings in non-immune persons indicates that the febrile attack is due to malaria, but the presence of older forms in immune individuals means that the attack may be due to some other febrile illness in a malaria carrier.

KITCHEN and PUTNAM (p. 5) have studied the morphology of gametocytes of *P. falciparum* of certain strains, and have found that there is so much variation within the strains that attempts to identify strains by these characters would be extremely difficult. The outstanding characters of gametocytes in general, however, can be defined: they are usually sausage-shaped, rather than crescentic; in males, chromatin and pigment occupy both central and outlying zones, but in females they tend to be central; male pigment is diffuse and light, but female pigment tends to be compact and dark; in males, individual chromatin is diffuse and vesicular, but in females it is compact and vesicular.

DE ZULUETA (p. 259) states that he has observed schizogony of *P. falciparum* in the peripheral circulation in 2–4 per cent. of a series of cases in Bogotá; he thinks that certain strains exist which normally reproduce in this way, and that in these cases such forms are of less grave significance than usual.

KIKUTH (p. 724) concludes, from an examination of the evidence, that the tendency to relapse after 8 or 9 months is a feature of infection with certain strains of *P. vivax*, particularly those of European origin, and that it is not dependent on factors outside the parasite itself. It is now generally held that the exoerythrocytic stages are those which persist in these cases. Treatment to prevent these relapses is not very satisfactory, though plasmoquine (pamaquin) has some effect, especially when combined with atebrin (mepacrine) as in Atepe-tablets (atebrin 0·1 gm., plasmoquine 0·005 gm.).

Mosquito Transmission.

ROSS and ROBERTS (p. 256) have produced an atlas of 18 Old World *Anopheles* important in malaria.

KALANDADZE and SAGATELOVA (p. 916) make the point that anopheline eggs (or larvae) may survive at the bottom of depressions, once collections of water, which have been dried in the course of anti-larval operations [it is difficult to see how larvae can persist, unless the drying is very incomplete]. When the depression fills (by rain or irrigation) the water becomes repopulated with larvae from these eggs. They have therefore made experiments on the resistance of eggs of *A. maculipennis* to desiccation, and have shown that it depends to some extent on the stage of development attained by the embryo, but more on the retained humidity of the soil. Control by the drying of water collections, therefore, can be successful only if desiccation is complete, since in the presence of slight moisture the eggs can survive more than a week. Anopheline eggs are more resistant than culicine. [This is obviously an important subject in relation to the periodical drying of rice fields or irrigation channels elsewhere.]

SHIPITSINA (p. 719) has studied the area of water surface which is filtered by the larva of *Anopheles* in feeding, and relates this, in the various larval stages, to the use of Paris green. Details should be sought in the original abstract.

SHUTE (p. 528) sums up the position in England with regard to the possibility of malaria transmission by the indigenous species of *Anopheles*. The only efficient vector is *A. maculipennis atroparvus*, the brackish water breeder, and the transmission period is short, June to September. He discusses preventive measures which could be taken if malaria were once more established.

WILLIAMSON (p. 820) has investigated, in England, the relation of ferruginous water to the breeding of *A. maculipennis atroparvus*. These waters are not themselves harmful to the larvae, except that they are deficient in larval food. They lack algae, whose growth is probably inhibited by the presence of colloidal iron and associated peaty substances in the water.

OLZSCHA (p. 256) found that almost all the female anopheline eggs collected in the Polish province of Posen were *A. maculipennis messeae*. The mosquitoes bred out were kept in a warm room and fed on pigs' blood diluted with half the volume of water, sugar being added. They sucked this up from cotton wool moistened by the diluted blood. JUKOV and KRASIKOVA (p. 917) have shown that *A. maculipennis messeae*, hibernating in cellars in Siberia, haunt the living quarters throughout the winter, and that they breed during that period. It was demonstrated that they lay eggs in the moist soil of flower pots in the houses. Mosquitoes can become infected during the winter, and the parasites can complete their development in the cold season. House infections are therefore of epidemiological importance. [It was known that some species of *Aëdes* may lay eggs in mud or places where water is likely to collect ; the observation that anophelines may do the same is most interesting.]

DAVIES (p. 448) reports observations on the breeding of *A. claviger* (*bifurcatus*). Details cannot be further abstracted.

DE MEILLON (p. 182) has written an account of the entomology of malaria in Africa south of the Sahara, but this cannot be summarized here.

In the *British Medical Journal* (p. 256) there appeared an editorial note in which it was stated that *A. gambiae melas* [subsequently known as *A. melas*], the important vector in Freetown, breeds in one form only of mangrove swamp, and that this form grows in limited clumps, and can be eliminated.

VAUCEL and CAMPOURCY (p. 94) report infection in *A. gambiae*, *A. funestus* and *A. splendidus* in the French Cameroons. [The last mosquito is referred to as *Neocellia splendida*. *A. splendidus* is a Far Eastern species ; it is therefore uncertain what species is meant, perhaps *A. maculipalpis*.]

SCHWETZ (p. 90) has investigated the incidence of malaria in relation to altitude in the Belgian Congo, and concludes that the upper limit may be taken as 1,750 metres. *A. gambiae* is not found above this height. The absence of malaria at high altitudes seems to be due to the absence of a vector rather than to the influence of cold in impeding the development of the malaria parasite in the mosquito.

GLASGOW and MACINNES (p. 6) show that *A. gambiae* is the only important vector in British Somaliland. VAN SOMEREN (p. 257) also found *A. gambiae* to be common in British Somaliland, though he states that it has not previously been recorded there. Other species are mentioned.

DE BURCA and IMDAD ALI SHAH (p. 640) have investigated the *Anopheles* of Eritrea. *A. gambiae* is found up to 8,000 feet, and breeds chiefly in pools in the river beds, but also in many other waters, including domestic collections. This mosquito is probably the main vector, and is probably responsible for the epidemic malaria which exists up to 6,300 feet ; *A. funestus* is rarely found.

RAJINDER PAL (p. 448) has investigated the longevity of *A. culicifacies* under controlled conditions of temperature and humidity. Details should be sought in the original.

WHITE and RAO (p. 720) show that, contrary to expectation, *A. culicifacies* is not a vector in Vizagapatam, though it is found there. *A. varuna* is also

negligible as a carrier, and shows little inclination to enter human dwellings, differing in this respect from *A. varuna* of the Jeypore Hills, where it is an important carrier. The chief vector is *A. stephensi mysorensis*.

WHITE (p. 721) shows that the chief vector in the Hazaribagh Ranges is *A. fluviatilis*, and that *A. culicifacies* transmits to some extent from July to September. An outbreak due to increased breeding of *A. stephensi* in the wells of one town is reported.

VISWANATHAN and RAO (p. 641) note that *A. fluviatilis* tends to enter dwellings soon after dusk, and that it tends to feed early, though feeding goes on throughout the night.

KNOWLES and BASU (p. 531) have found experimentally that temperature appears to be a more important factor than humidity in the transmission of malaria by *A. stephensi*. The heaviest gland infection with *P. vivax* took place at 80°F., and the most rapid development at 90°F. for both *P. vivax* and *P. falciparum* (9 days). Similar results were found with *A. annularis*.

ROY (p. 449) has shown that *A. subpictus* can be infected under laboratory conditions, but that the sporozoite rate is much less than that of *A. stephensi*. He concludes that although natural infection may occur in the more humid parts of India, the danger from *A. subpictus* is negligible.

WHITE *et al.* (p. 720) show that, in the Orissa coastal plain, *A. annularis* is the chief vector of malaria, though 17 other species have been found, and *A. aconitus* has also been demonstrated with sporozoite infection. *A. annularis* breeds in still water containing vegetation and filamentous algal growth, chiefly in tanks and ricefields; its transmission season is from September to November or December. Malaria epidemics are superimposed on considerable endemicity; they are very local and apparently depend on biological factors favouring *A. annularis*.

DAS (p. 89) notes infection found in *A. aconitus* in East Bengal. Hitherto this mosquito has not been considered an important vector in this area.

ROBERTS (p. 641) brings evidence which indicates that *A. annulipes* is as efficient a vector of *P. vivax* and *P. falciparum* as the more well-known carrier, *A. punctulatus moluccensis*, of Australia. It would be unwise to concentrate gametocyte carriers in any area where *A. annulipes* is abundant.

RENN (p. 182) discusses the surface forces which operate to induce the grouping of *Anopheles* larvae around the stems of aquatic grasses.

EYLES and COX (p. 642) have estimated *A. quadrimaculatus* populations by a technique of marking similar to that which has been used in work with *Glossina*. EYLES (p. 642) describes the method in detail. JONES (p. 532) has noticed that *A. quadrimaculatus*, in the Mississippi valley, may remain so long in a favourable shelter that their abundance may not indicate very recent production from a breeding place. He has proved that a female can survive for at least 35 days in nature. He comments on the effect of water fluctuations, in a reservoir, on mosquito breeding. HIXSON (p. 532) discusses the larval population of *A. quadrimaculatus* in relation to the fauna of a lake and a pond in Florida. *Gambusia affinis* was the predominating fish, and its effectiveness as a predator increased with the size of the mosquito larvae.

SISK (p. 355) notes the importance of controlling the breeding of *A. quadrimaculatus* in N. Carolina, in view of the fact that many of the men who will return after the war from military service will bring the infection back with them.

BOYD and RUSSELL (p. 92) have failed to find any simple genetical explanation of the fact that infection of *A. quadrimaculatus* with *P. vivax* is irregular.

KUMM and KÚNIGA (p. 643) have shown that, in Costa Rica and El Salvador, the most malarious months of the year were usually preceded by an increased prevalence of *A. albimanus*. WEATHERSBEE (p. 643) shows that *A. albimanus*

though a noted transmitter of malaria, prefers horse to man, in the proportion of about 20 to 1. PRITCHARD and PRATT (p. 722) has compared a light trap and an animal trap (baited with horse or calf) for use in connexion with *A. albimanus* in Porto Rico. Each has advantages, and the best results are obtained by the use of both.

BRUCE *et al.* (p. 93) give a list of the *Anopheles* found in British Guiana. In the BRITISH GUIANA MEDICAL ANNUAL, 1943 (p. 529) is a report on malaria. *A. darlingi* is the chief vector, and is the most prevalent anopheline ; infection was not found in other species dissected, but it is thought that *A. "tarsimaculatus"* (probably *A. aquasalis* and *A. oswaldoi*) may be a vector in Georgetown and elsewhere. *A. albitarsis*, an important vector in Brazil, rarely enters houses in British Guiana. No anophelines breed in the bromeliads of British Guiana.

CAUSEY *et al.* (p. 644) have published an illustrated key to the eggs of 30 species of Brazilian *Anopheles*.

CORRÊA (p. 1006) describes the vectors of State of São Paulo. *A. darlingi* and *A. tarsimaculatus* are the chief transmitters, but *A. cruzi* is a vector in forest areas, breeding especially in trees parasitized by bromeliads [*cf. A. bellator*]. More work is necessary to determine the part played by *A. strodei*, *A. albitarsis* and *A. noroestensis*.

DA FONSECA and DA FONSECA (p. 93) have investigated the transmission of malaria in an island off S. Paulo (Brazil), and have found *A. oswaldoi oswaldoi* and *A. oswaldoi guarujaensis* to be capable of infection with *P. vivax* and *P. falciparum*. The latter mosquito was probably responsible for epidemics of malaria in 1940 and 1941.

FRAGA (p. 447) notes that *A. cruzi* and *A. bellator* are the probable vectors of malaria in Paranagua, Brazil. They breed in the bromeliads which are parasitic on local vegetation.

Transfusion Malaria.

DAS GUPTA (p. 92) records a case in which transmission of *P. falciparum* occurred through transfusion of blood from a donor who, though he had no history of previous malaria, had just returned from a malarious district, and was in the incubation period of the disease, when he was bled. If it is impossible to eliminate the risk of infection, the recipient should be given 5 grains of quinine thrice daily for three days after transfusion.

BARTOSHEVICH (p. 8) reports malaria transmitted by transfused blood (in one case preserved for 3 days) from a donor who, though negative to blood examination, came from a malarious district. It is thought that repeated removal of blood from this donor activated a latent *P. vivax* infection.

As a result of careful tests, LOZNER and NEWHOUSER (p. 91) conclude that the risk of transmission of malaria by transfusion of plasma is practically non-existent.

Pathology and Immunity.

DHAYAGUDE and PURANDARE (p. 533) have made pathological studies in cerebral malaria, for details of which the original abstract should be consulted. It may be noted that they state that *P. vivax*, as well as *P. falciparum*, can produce severe cerebral damage, and that in 7 of the 33 cases in which the species of parasite was determined, *P. vivax* was the only one found, and was therefore presumably responsible for the cerebral lesions.

LENDRUM (p. 822) suggests that tissues suspected of being malarial should, for pathological examination, be fixed in formalin-free fluid, and gives details of a method in which potassium bichromate and mercuric chloride are used.

CLARK (p. 1001) states that immunity in malaria is never absolute, and may be broken by fatigue, exposure, underfeeding or the introduction of fresh strains of parasites. In villages in the Panama Canal zone there is a significant incidence of malaria at all ages; in a Negro labour force in Cuba, who had had lifelong exposure to malaria in Haiti, there was sufficient reaction to malaria to decrease the efficiency of the labour force.

SCHILLING (p. 723) brings evidence which indicates that protective antibodies appear in the blood some hours (and are most readily demonstrated 12–18 hours) after the height of the fever.

COGGESHALL (p. 94) has given an outline of the process of immunity in malaria; the paper should be consulted in the original.

Diagnosis: Tests.

WOLMAN (p. 181) gives a stain formula which he has found to give more satisfactory results than Field's stain, of which it is a modification. SINGH and BHATTACHARJI (p. 822) describe a rapid, water-soluble stain for malaria parasites. Details are given in the original abstract. HEIMBERGER (p. 823) also describes a new method of preparing slides for staining. KERN and KUSTNER (p. 644) describe a new staining technique. CRAWFORD (p. 1002) describes the staining of blood films, and in comment on this paper SHUTE makes certain criticisms and suggestions. These should be sought in the original.

DIXON (p. 723) refers to the use of Leishman's stain in demonstrating malaria parasites in cerebral tissues, and in comment, CORSON recalls the method of obtaining tissue by puncturing the brain of the cadaver through the orbital plate of the frontal bone.

DENHOFF and PIPER (p. 918) refer to the difficulties in the diagnosis of malaria in troops under field conditions in the south-west Pacific, especially in men who have been taking suppressive drugs. In such cases, however, they advocate repeated blood examinations at intervals of 4–8 hours, and state that, if malaria is present, parasites are usually found in thick smears before the sixth examination, but that the parasites may be atypical in appearance. They give directions for staining, which should be sought in the original abstract; in comment, SHUTE makes a number of criticisms of the authors' methods.

In writing of some common misconceptions of malaria, LOWE (p. 997) states that it is wrong to think that untreated malarial patients in whose blood parasites cannot be found are common. A properly stained thick blood film still remains the most reliable method of detecting infection, and a negative result usually rules out the disease. Sternal puncture rarely shows parasites when a thick blood film fails. He points out, however, that the presence of parasites is not necessarily an explanation of the symptoms.

AITKEN (p. 95), however, finds sternal puncture a useful diagnostic procedure in cases in which examination of thick blood films is negative. Malaria parasites are more numerous in the sternal marrow than in the blood, but the author draws attention to some of the difficulties in interpreting the results of sternal puncture.

YU and YING (p. 95) find that sternal puncture often gives positive results when blood examination is negative, both in *P. falciparum* and *P. vivax* infections. The ephedrine provocative test is also useful, but not to the same extent as sternal puncture. RUMBALL *et al.* (p. 95) also report on the value of sternal puncture where blood examination is negative, especially in latent malaria. In the diagnosis of pernicious malaria, HERMITTE (p. 183) advocates sternal, or even liver, puncture if the blood is negative. If all are negative, subtertian malaria can be excluded [but, as Corson points out in comment, microscopic diagnosis depends on good technique, and where this is not possible, clinical experience should not be overlooked.]

PACKCHANIAN (p. 823) notes that exposed blood films may become contaminated with the excretion of flies, containing flagellates.

DAWBER (p. 364) brings evidence to show that malaria may be the cause of false positive syphilitic serum reactions; in general, these reactions become negative within 10 days of the institution of anti-malarial treatment, but occasionally this period is longer. HAUER (p. 8) found more positive serum tests (Wassermann, Meinecke and Kahn) in patients suffering from first attacks of malaria than in relapses.

SAGEL (p. 356) claims that in naturally induced malaria there occurs a monocytosis which is not found in inoculation malaria, and that the difference is due to the stimulation of the reticulo-endothelial system by the sporozoites. He thinks that it may justifiably be assumed that an exoerythrocytic phase of development occurs in man.

Clinical Findings.

BOMFORD (p. 730) has attempted an analysis of the frequency of attacks of malaria in the staff of a hospital in West Africa; the numbers of persons on which observations were made are admitted to be small, but the results of the enquiry suggest certain possibilities. The attack rate varied according to rank—low in officers and nursing sisters, moderate in sergeants, high in private soldiers. This suggests an influence connected with housing, food and opportunities for rest and recreation. Incidence was high in those doing night duty; it was not related to the use of alcohol or to obvious carelessness, but seemed to be connected with other causes of ill health, *e.g.*, diarrhoea. Inadequate convalescence is a potent cause of early relapse. Individuals apparently vary in their liability to attacks of malaria.

OGBORN *et al.* (p. 1000) regard as unjustifiable the tendency to regard all fevers in East African natives as malaria, until the contrary is proved. Of 512 Africans admitted to hospital for fever, 384 proved to be cases of uncomplicated malaria, but in 116 cases other diseases were responsible for the condition, the finding of malaria parasites being incidental. Among the diseases responsible were relapsing fever, typhoid, amoebiasis, pneumonia, acute respiratory disease, and bacillary dysentery. In assessing the significance of positive slides of the blood of Africans, attention should be paid to the state of immunity, the clinical condition and the intensity of the infection. Men were considered immune if they had spent their boyhood in regions where malaria is prevalent for more than half the year. In such patients quite commonly there were malaria parasites in the blood, but the patient was not suffering from clinical malaria.

CARNEY and LEVIN (p. 730) note that 9·7 per cent. of a group of Italian prisoners of war were found to harbour parasites (chiefly *P. vivax*) although most of these men gave no history of malaria.

STIRK (p. 536) has noted signs of pulmonary involvement in about 10 per cent. of malaria cases, and a similar proportion in sandfly fever. The signs may be of bronchitis or incipient pneumonia. Sulphapyridine and quinine have been given concurrently without ill effect. SHONE and PASSMORE (p. 184) have found auto-haemagglutination in certain cases of pneumonitis associated with malaria, and in other conditions. As MEGAW points out in comment, the findings bring fresh evidence of the fact that malaria predisposes to respiratory infections.

RAVEN (p. 537) writes of the relation of malaria to surgery; the disease may be provoked by injuries, burns or operations, or may simulate conditions calling for surgical interference.

BAUGÉ (p. 639) found 78 mixed infections with various malaria parasites in 15,606 blood examinations in Tunisia, and 30 in 8,531 examinations in the

south of that country. More than one-third of the mixed infections were in children under 10 ; they were more severe than ordinary infections.

ECKSTEIN (p. 361) discusses the peculiarities of malaria in childhood, as he has seen it in Turkey. In particular he mentions the association of malaria with malnutrition, and of malaria with noma, which is relatively common.

THONNARD-NEUMANN (p. 362) records his observations in cases of chronic malaria with splenomegaly ; treatment with quinine, ephedrine, arsenic and iron was successful, but he points out the frequent association with other diseases such as hookworm infection, syphilis and amoebiasis, which need treatment.

BAUM (p. 450) reports two cases of chronic malaria in which the symptoms were those of persistent anaemia, without demonstrable parasites in the blood, except on one occasion in one patient. Treatment with iron was ineffective, but antimalarial drugs produced rapid cure. SEELIG and HEMMING (p. 724) report from India a number of cases of megalocytic anaemia as a sequel of malaria. These were probably nutritional in origin, and required anti-malarial treatment supplemented by iron, liver and a full diet.

RENIGER-ARESHEVA (p. 919) has studied the question of hypovitaminosis C in relation to malaria and pregnancy. The condition is provoked by malaria, and in spring the vitamin C content of the placenta of malarious women is lower than that of healthy women on the same kind of diet. It is thought that certain symptoms—petechiae, stomatitis, abortion—cannot be explained fully on the basis of malaria alone, but that deficiency of vitamin C plays some part.

VOINO-YASENETSKY (p. 645), in a series of post-mortem examinations, has found no support for the view that colitis can be caused by malaria.

EDGE (p. 727) has examined the statistical evidence bearing on the subject of the relation between malaria and nephritis in the British West Indies, but from the official data has failed to find information which throws light on the subject.

BERLIN (p. 824) discusses malarial psychoses, and concludes that they may result from infection with any one of the three principal species of parasite.

OGANESOV *et al.* (p. 535) propose a clinical classification of malaria under the following heads : Pre-morbid form ; Primary malaria ; Protracted malaria ; Meta-malarial disorders. These, with various subdivisions, they relate to the symptomatology.

PERVES (p. 354) has found *P. falciparum* in the spleen or bone marrow of three stillborn infants in a highly malarious area of the Cameroons. He has found this parasite also in the blood of the umbilical cord or in the finger blood of a considerable proportion of infants examined soon after birth. As a rule, however, parasitaemia and splenic enlargement of infants become apparent only after the age of 4 months, with peak infection at 18 months.

The importance of early diagnosis and adequate treatment of *P. falciparum* malaria have often been stressed ; MOST and MELENEY (p. 536) once more emphasize the subject and draw attention to the difficulties. Malaria should be suspected in every patient recently returned from the tropics, whatever his symptoms ; fever may be absent even in overwhelming infections. A single negative blood film is not enough to exclude malaria. In treatment, mepacrine is advocated, but for cerebral malaria quinine should be given by injection.

HUGHES and BOMFORD (p. 357) describe the clinical features of *P. falciparum* malaria in British troops in West Africa. Details should be sought in the original abstract, but in general, and under the existing conditions, the disease was milder than was expected. Less than 10 per cent. of the patients could be described as severely ill. In an editorial comment in the *British Medical Journal*

it is suggested that suppressive medication or other preventive measures may have been responsible for this, and that the troops are now much more malaria-conscious than they were in the war of 1914–18.

SIMPSON *et al.* (p. 359) report on a series of 4,647 cases in the South Pacific, where hyperendemic conditions exist; the patients were members of the United States forces. Parasites were found in 1,184, and details are given of these men. Twelve per cent. proved refractory to one or more courses of treatment, and almost half of these had *P. falciparum* infections. There was only one case of blackwater fever, and only one death. It is remarked that nearly half the patients had received regular suppressive treatment, at first 10 grains of quinine daily, later 0·2 gm. atebrin twice each week [another proof that suppressive treatment of this order is insufficient in hyperendemic areas]. No significant toxic reactions were observed as a result of the use of atebrin. In treatment, quinine and atebrin were given concurrently. SIMPSON and SAGEBIEL (p. 360) describe 12 cases of cerebral malaria which occurred in the series referred to above. Details are given which should be sought in the original abstract; all the patients recovered.

HUSSAIN and BROADBENT (p. 359) draw attention to the fact that *P. falciparum* infection can simulate acute abdominal conditions (even acute intestinal obstruction) and that pain, with diarrhoea and blood in the stools, may also, apparently, be due to the same infection. He records cases which cleared up on anti-malarial treatment alone.

BREWIS (p. 7) reports a case of pernicious subtertian malaria in which the symptoms resembled those of blackwater fever, though this was the first attack of malaria the patient had suffered, and he had taken no quinine.

WHITEHALL (p. 450) describes a case of cerebral malaria with haematuria, which was regarded as due to true malarial nephritis. Treatment with injected quinine, and later with mepacrine, was successful.

NELSON-JONES (p. 537) writes, as have so many others during the present war, of the extremely varied symptoms to which infection with *P. falciparum* may give rise, and remarks that differential diagnosis involves almost the whole of medicine.

RODGER (p. 726) reports a very low relapse rate in the malaria treated on a mine in N. Rhodesia, where most of the infections were due to *P. falciparum*. Immediate treatment (largely with quinine) is regarded by the author as one of the essentials in preventing relapse.

SCOTT (p. 920) describes a few cases of herpes simplex of the cornea in patients with subtertian malaria in West Africa.

GENT (p. 6) reports three fatal cases of cerebral malaria on board a cruiser; but remarks that the element of heat stroke could not be altogether ignored; the two conditions are probably closely connected. SNEDDON (p. 259) reports a fatal case of cerebral malaria, and, commenting upon it, CAMERON (p. 260) points out that, in the treatment of such cases, quinine should not be spared. Two, or even three, intramuscular injections of 15 grains may be needed daily, and should be given until vomiting ceases and coma is ended. FENTON-RUSSELL (p. 921), however, draws attention to the milder types of cerebral malaria which are more common than the severe states. He does not advocate intramuscular injection of quinine, because of abscess formation, preferring intravenous therapy.

HAMBURGER (p. 723) comments on six cases of cerebral malaria, and draws attention to points of clinical importance. DON and MEYER (p. 358) report an unusual case of cerebral malaria in West Africa.

Symptomless parasite carriers have been investigated by SHEINKER, SARIKIAN, REMENNIKOVA and SHISHLIAEVA-MATOVA (p. 817) in Russia. Most of the cases found were carriers of *P. vivax*, and most had had symptoms at

some time. In the majority the spleen was not palpable, and a spleen survey would, therefore, not have been useful in detecting them. Mosquitoes are readily infected in spite of the small numbers of parasites. Treatment is useful in eliminating the carrier state. After a large epidemic, the following spring there are found large numbers of carriers, many of whom give no history of malaria.

GAMMIE (p. 1002) reports a case of congenital *P. vivax* malaria in a child born in England.

TAREJEV *et al.* (p. 257) again refer to the fulminating type of malaria ascribed to *P. vivax*, which they have previously described in Russia. Cerebral manifestations are common, even in the first paroxysm. The prognosis is grave, but immediate injection of quinine or mepacrine is a life-saving measure. POLUMORDVINOV (p. 823) refers to the fulminating type of *P. vivax* infection which has caused deaths in children. Those who died showed no constitutional anomalies, the main subjective symptom being severe headache. TROITSKY (p. 823) reports 61 fatal cases in 1941, when there was a severe epidemic outbreak. [The history of these cases and outbreaks of pernicious *P. vivax* malaria is so unusual that it leaves the impression that the cause is by no means fully elucidated.]

PUHLMANN (p. 919) points out that persons exposed to infection may complain of various mild complaints, particularly in autumn or winter, which are due to *P. vivax* (occasionally to *P. falciparum*). Diagnosis may be difficult and parasites may only be seen after examination of several thick films.

A study of malaria in the Caucasus has led KEKHCHER (pp. 258, 449) to the conclusion that *P. vivax* infection does not, as a rule, last more than 12–18 months, though in a small proportion of cases it may persist for 3–4 years; and that *P. falciparum* infection usually lasts for 2–12 months. He notes a tendency to diagnose chronic malaria on insufficient evidence in those with a history of that disease.

WILCKENS (p. 183) writes of certain German soldiers who were presumably infected near Lake Ladoga in N. Russia, and who exhibited long latent periods before the onset of fever.

SHUTE (p. 1002) reports relapse of quartan malaria in a patient who had not lived in a malarious country for 21 years.

CIUCA *et al.* (p. 645) contribute a study of induced *P. malariae* infection. This cannot satisfactorily be condensed more than in the original abstract, which should be consulted. *Charles Wilcocks.*

RABIES.

A REVIEW OF RECENT ARTICLES. XLII.*

i. *Virus.*

The question, whether the virus of rabies can be transmitted from the mother to the foetus *in utero*, has been studied by numerous investigators. The evidence of the earlier work was conflicting. KONRADI (*Zbl. Bakt.*, I. Abt. Orig. 1905, v. 38, 60; 1908, v. 47, 203; 1914, v. 73, 287, and *Ann. Inst. Pasteur*, 1916, v. 30, 33) attributed the variable and conflicting results to the use of the rabbit instead of the more susceptible guineapig as the test animal for the detection of virus in the foetuses, the inoculations being made subcutaneously instead of intracerebrally and the failure to keep the test animals under observation for a sufficiently long period. He succeeded in demonstrating that rabies could be

* For the forty-first of this series see this *Bulletin*, v. 41, p. 904.

transmitted from the mother to the foetus, in rabbits, dogs and guineapigs. REMLINGER (*Ann. Inst. Pasteur*, 1919, v. 33, 375), in a limited number of observations, also recorded some positive results. Certain viruses and other infective agents have been propagated by their inoculation into mammalian foetuses developing *in utero* and into chick and duck embryos. OLIVEIRA and BETTENCOURT[1] have now made experiments with the virus of rabies to determine whether it can be cultivated in the embryo of laboratory animals *in vivo*, and whether it can pass through the placenta and infect the mother. They employed rabbits. Two strains of virus were used. A "fixed" rabbit strain which was the one they generally used for making vaccine and a "street" strain which, after recovery from an infected dog, had undergone one passage in guineapigs. Their general technique was as follows :—rabbits in the second week of gestation were selected, and laparotomy was performed under ether anaesthesia. The syringe used for the inoculations had a capacity of 1 cc. and was graduated in 1/100 cc., and fitted with a fine needle 1 cm. long. Quanta of virus in Milam's fluid were inoculated intracerebrally (0·05 cc.) or intramuscularly into the hip (0·5 cc.) of the foetuses *in situ*, through the wall of the uterus which was subsequently cauterized at the point of entry of the needle. In certain experiments, virus was inoculated in a quantum of 0·5 cc., into the amniotic sac after the withdrawal of a corresponding amount of the fluid. In others again, quanta of 1 cc., of virus were inoculated slowly into the wall of the uterus at an oblique angle. Proof of infection of the foetuses was secured by inoculation of suspensions of their brains intracerebrally into guineapigs, and when street virus was used histological confirmation was obtained from smears of the *Cornu Ammonis* stained for Negri bodies by Lentz's method. The brains of the mothers of virus-infected foetuses were examined for the presence of possibly latent virus by histological study of the Ammon's horn for Negri bodies and by inoculation of suspensions intracerebrally into six mice. Three of these mice were killed on the 5th, 6th and 7th days respectively, so that their brains could be examined for Negri bodies, and the other mice, which incidentally did not develop symptoms in any experiment, were killed and their brains studied histologically for Negri bodies four weeks after inoculation.

Observations are recorded on 19 rabbits ; three inoculated with "fixed" virus and sixteen inoculated with "street" virus. The results showed that the virus inoculated intracerebrally or intramuscularly into the foetuses or into the amniotic fluid, could, in most cases, subsequently be recovered from their brains when they were born, either alive or dead, from one to eight days later. Negri bodies were demonstrated both in the brains of the inoculated foetuses and in the brains of the test guineapigs inoculated, when street virus was used. If certain of the foetuses in the womb were left uninoculated they did not become infected with the virus. None of the 14 mothers, the foetuses of which had been inoculated with street virus, developed rabies during the period of more than six months within which they were kept under observation. Four died of an intercurrent infection. The brains of the four which died and "some" of the survivors were examined histologically for Negri bodies and suspensions were inoculated intracerebrally into mice, but with negative results. This confirmed that none of the mothers became infected with virus from the foetuses.

Two pregnant rabbits inoculated with "street" virus, into the walls of their uteri, died of rabies on the 31st and 56th days respectively. Negri bodies were demonstrated in their brains histologically, and virus by inoculation of guineapigs intracerebrally. The young of the first mother did not become infected with rabies, but three of the six young rabbits of the second mother died of rabies.

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[1] DE OLIVEIRA, J. C. & DE BETTENCOURT, A. Perméabilité du placenta au virus rabique inoculé à des foetus de lapine. *Arquivos Inst. Bact. Câmara Pestana.* 1943, v. 9, No. 1, 1–17, [16 refs.]

The authors state that their observations point to the placenta as the obstacle to the passage of virus from the foetus to the mother. They hope to be able to determine whether this inhibition is a " phenomenon of filtration " or due to some special substance which neutralizes the virus. They observe that the absence of nervous connexions between the foetus and the mother must render difficult the passage of a virus which usually travels by nervous paths.

ii. *Methods of Treatment and Control.*

Army doctors are immediately responsible for maintaining the health of their troops and preventing any spread of infection among them. To this end, even in peace time, they have to take into account any disease spreading among the civil population with which the soldiers come in contact, and, if necessary, collaborate with civilian doctors in controlling diseases, the spread of which may endanger the men under their care. Responsibility is increased in time of war since the risks are generally greater in territory where the fighting is going on, or in occupied territory where disorganization of the health services and medical supplies may have taken place. Under such circumstances, care of the civilian population may even become of primary importance.

HASCHE-KLÜNDER[2] records some observations on circumstances in the Southern Ukraine, during a period of German occupation, from August to November 1942, which necessitated measures to control rabies, and to treat persons who had been bitten by, or had been in contact with, infected animals. The first incident, in August 1942, was the arrival of a woman with her five children in the local disease control centre, from a village some distance away. These children had been bitten by a dog. The dog had been killed and the woman brought the carcase with her. The Russian veterinary investigation officer of the institute of this State reported the finding of Negri bodies in the *Cornu Ammonis* of the brain of this animal. The first measures taken were to order the shooting of all dogs in the village, and a decree was issued to control dogs in the region. Vaccine was procured from a Russian State Bacteriological Institute to treat people who had been bitten. Nine weeks later the disease was introduced again into the same village by a rabid stray cat from another locality.

During the two outbreaks 54 people were vaccinated, 31 of these had been bitten by infected animals and 23 adults and children were treated " prophylactically " since they had been tending, playing with, or otherwise in contact with rabid animals, either during the incubative stages or subsequently. Some of the latter group had been contaminated with saliva or blood during the process of killing the animals. The existence of the disease in the animals concerned was confirmed by controlled clinical observations or by laboratory diagnostic methods. The Russian vaccine furnished was prepared according to Phillips's method [see PHILLIPS, *J. Immunology*, 1922, v. 7, 409; the brains of rabies-infected rabbits are ground up, and quanta of 0·1 cc. of pure glycerin added to each 15 mgm. of brain tissue. This glycerinized suspension is stored at −2°C. in an atmosphere freed of water and oxygen, by the use of pyrogallic acid and caustic potash. The virus suspension will retain its activity for several months. At the time of use, 0·5 per cent. carbolized saline is added in the proportion of 2 cc. to each 0·1 cc. of glycerinized virus suspension]. The doses of the vaccine injected and the duration of the treatment, 10 to 40 days, were determined by the degree of risk to which the patients had been subjected, *viz.*, the site, extent and severity of the bites, and in the case of unbitten persons, whether some contamination with saliva had taken place, and whether predisposing factors such as skin lesions existed. Vaccine treatment was

[2] HASCHE-KLÜNDER, R. Berichte ueber allgemeine ärztliche Beobachtungen und Erlebnisse im Kriege und im Frieden. Zur Lyssa-Abwehr in der Ukraine. *Deut. Militärarzt.* 1944, Feb., v. 9, No. 2, 106–11. [18 refs.]

commenced in some cases as early as the first day after the bite, and in the majority the first injection had been given within the 8 days after the bite of, or contact with, a diseased animal. Exceptions were 9, 9, 11 and 16 days after bite or contact. In 40 cases the rabid animal was a dog, in 7 a cat, in 4 a cow and in 3 a calf. Two tables are given which summarize the information on the treated cases. No serious complications were recorded as a result from the vaccination, but a "red-haired maid" developed fever and urticaria after the 4th injection of vaccine. With the permission of the parents treatment was not discontinued and calcium was administered, the fever subsided and the "allergic" symptoms disappeared. In general, the vaccination treatment produced no reactions, but on the appearance of the least signs of reaction a hot poultice was applied as a relief. During the period of occupation of the State, from 1.8.42 to 15.11.42, no cases of rabies in man were recorded, and the last information, received on 15.3.43, was that no human cases had been reported up till then.

The author points out that he had the advantage of the assistance of the Russian civilian doctors and officials, who were accustomed to deal with such situations as outbreaks of rabies, and possessed knowledge of handling rabies infection which the German sanitary officers did not have. In view of the fact that rabies is a more serious problem in Russia than in Germany, each large state has a Hygiene and Bacteriology Institute, which can deal with the problems of immunization, etc., whereas in Germany the vaccination arrangements are not decentralized to the same extent.

The effectiveness of the control of rabies is dependent, as the author points out, on the rapidity and thoroughness of the precautions taken, such as quarantine measures for observing suspected animals for diagnostic purposes, destruction and banning of dogs and vaccination of bitten persons.

iii. *Post Vaccinal Paralysis.*

THOMAS[3] describes a case of acute ascending paralysis (Landry) which developed on the date of the 14th daily injection with rabies vaccine, the type of which is not stated. The patient had been bitten on the right hand by a dog "thought to be rabid," and the wound was slight. There was no reaction following the first injection, but the patient, who came under the care of the author two days after the last injection, when paralysis had set in, stated that there was considerable burning, redness and itching at the site of the second injection. This type of reaction occurred after all subsequent injections except the last three of the series. The history of the case is described in detail. Incidentally the family history was negative for allergic conditions as well as for mental or nervous disorders, diabetes, or other familial diseases. The paralysis ultimately affected the legs, arms, trunk, back and neck. A year from the onset of paralysis, muscle strength had improved, although there was still slight foot drop and weakness in the hand grip, but reflexes were "fairly active."

The treatment applied is stated to have a "scientific basis" and to be harmless, but the author is not convinced that there was any value in the methods of treatment employed or that recovery would not have taken place without treatment. The treatment was the application of a modified type of the Kenny treatment, by a "physiotherapist who had been trained in this method." [This treatment has been used for paralysed muscles in poliomyelitis, and is not the orthodox method for such cases.] Thiamin hydrochloride was administered intravenously, orally and, later, intramuscularly since it is stated to be beneficial in neurological disorders, including poliomyelitis.

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[3] THOMAS, C. R. Complications following Use of Antirabies Vaccine with Suggestions as to Treatment. *Southern Med. J.* 1944, Oct., v. 37, No. 10, 539–43. [15 refs.]

The author has apparently been particularly impressed by an article by HORACK [this *Bulletin*, 1939, v. 36, 730] who considered allergy to be a factor in the development of reactions to antirabic treatment, since he expresses the opinion that " a review of the literature reveals an ever increasing amount of evidence in favour of an allergic basis for the development of complications following the use of antirabies vaccine." He suggests, as did Horack, that " all patients should be tested for sensitivity and if found to be sensitive should be desensitized before starting treatment." [There are cases of paralysis (*vide infra*) which have been recorded in which no special sensitivity to the antirabies vaccine was noticed during the course of the injections.] The wife of this patient, described by Thomas, had been bitten by the same dog, and she had undergone the same course of vaccine treatment and no unfavourable results were recorded.

IMRIE[4] points out that neurological complications following vaccination against rabies are fortunately rare, but when they do occur they may be particularly distressing. He describes a case of paraplegia following antirabies vaccination. The patient was an officer who had been bitten by a stray dog while in a city of the Middle East. The dog also bit several other people, and was presumably affected with rabies. Vaccination was commenced immediately and 15 daily injections of 10 cc. of " killed phenolized vaccine " were given. There was some local discomfort at the site, but no immediate ill effects were observed. Twenty days after the dog bite and the commencement of treatment the patient had pains, in the shins and lumbar region, which were believed to be rheumatic and were not severe. Twenty-nine days after the completion of the vaccine treatment serious paralysis set in, which gradually progressed and could be classified as of the dorso-lumbar type. The condition had greatly improved nine months later, but there was still weakness in the gluteal and lower abdominal muscles, though bladder and bowel function had returned. Re-education of the ataxic muscles was commenced at an early stage, at first by simple exercises in bed, later by increasingly complicated movements, and finally by lessons in walking. It is stated that much more recovery seems unlikely, and the improvement observed up to the time of writing the report had been largely due to the excellent mental attitude of the patient and the re-education of the muscles.

iv. *Miscellaneous.*

REMLINGER and BAILLY[5] report that they have compared " the immunizing power of ' street ' virus and ' fixed ' virus against the extremely severe test of intracerebral inoculation," and that their results had " shown them that the vaccinating power of the first is *nil*, while in the case of the second, on the contrary, a real vaccinating action, although in truth not very intense, was observed." [The reviewer has so far been unable to procure the report of the protocols of the experiments.]

In view of this observation, and taking into account some other differential characteristics between " street " and " fixed " virus, the authors make the tentative suggestion that there may be some difference in antigenic structure between the two, analogous to, but not of necessity identical with, that existing between " rough " and " smooth " strains of bacteria.

[Some 40 references to this complication of vaccination against rabies are given in this *Bulletin* between 1927 and 1936, and a particularly instructive table in 1928, v. 25, pp. 198–9.]

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[4] IMRIE, A. H. A Case of Paraplegia following Anti-Rabies-Vaccination. *J. Roy. Army Med. Corps.* 1944, Oct., v. 83, No. 4, 196–8.

[5] REMLINGER, P. & BAILLY, J. Le virus rabique fixe est-il *smooth* et le virus de rue *rough* ? *Arch. Inst. Pasteur d'Algérie.* 1943, Mar., v. 21, No. 1, 12–14.

REMLINGER and BAILLY[6] make some comments on the investigations on rabies which have been carried out in America, especially during the last decade. They stress the fact that from reports appearing there, the position with regard to the control of rabies and to the results obtained in the vaccination of man were far from satisfactory at the time the investigations were commenced. [There are many workers in America who still consider the position to be none too good. One of the hindrances appears to be lack of legislative measures which would ensure uniformity in methods of control.] Many important advances have been made in different centres, but the authors refer particularly to the research work carried out at the Rockefeller Institute. They have been able to confirm the usefulness of the white mouse for diagnostic purposes in the way advocated by the American workers. They believe, however, that there are limitations to its usefulness. They are not yet convinced that it is the best animal to use for immunity experiments. [They will perhaps change their opinion when they have had an opportunity of reconsidering the evidence on the use of the mouse-potency test in assessing the value of vaccines. It must be pointed out that the results of immunity experiments with rabies carried out in America, in mice and in dogs, have run in parallel. As already pointed out in a previous review, it is just possible that if the same care was taken in selecting the rabbits, *e.g.*, with regard to age and breed, for immunity experiments, the results obtained in these animals would run parallel with those in mice and dogs. Surely Remlinger and Bailly must agree that methods of estimating the potency of the virus used for making a vaccine and also the potency of the immunizing agent are desirable. Even if in actual fact a vaccine, which showed up badly in a mouse-potency test, might still give some measure of protection when used in man, it would appear to be preferable to use a product which gives a high degree of protection in mouse-potency tests. The use of the mouse has the advantage that it is a cheaper experimental animal than the dog, rabbit or monkey. This enables statistical evidence to be accumulated more easily.]

The present authors apparently feel that some of the earlier work on rabies has been treated somewhat cavalierly by some American authors, but this can no doubt be explained by an overwhelming desire to advance. They themselves point out that Pasteur himself said " la Science ne progresse qu'à condition de se détruire tous les 25 ans " and their appreciation, of the investigations on rabies carried out by the American workers, is confirmed by their suggestion that the rendezvous for a second International Conference on Rabies should be New York, the first having been held in Paris in 1927. *Ian A. Galloway.*

MALARIA.

PITA GANDARIAS, D. E. Contribución al estudio de la influencia del sexo y la edad en la adquisición de infección palúdica. [**Influence of Sex and Age in the Acquisition of Malaria Infection.**] *Rev. Sanidad e Hig. Pública.* Madrid. 1944, May–June, v. 18, No. 3, 207–18, 1 chart.

Abundant statistical material available in the Provincial Health Institute of Caceres in Spain has been used by the author to study the influence of the civil war on malaria incidence in his Province. To this end the age and sex distribution of malaria cases diagnosed by the dispensaries directly dependent upon the Central Antimalaria Commission, about 60 in number, as well as by Municipal

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[6] REMLINGER, P. & BAILLY, J. Remarques au sujet des travaux de l'Institut Rockefeller relatifs à la rage. *Arch. Inst. Pasteur d'Algérie.* 1943, Mar., v. 21, No. 1, 15–23. [27 refs.]

dispensaries, during the five-year period 1931–35, is compared with that of the quinquennium 1936–40. The figures show but little change in malaria endemicity. The population figures used are those of the 1920 census.

Malaria is most frequent in the age group 1–4, followed by the groups 5–9, under 1, and 10–14; thereafter the incidence steadily declines. At all age groups, except that of 60 and over, the male incidence is significantly greater than the female. The difference is greatest in the groups 10–14 and 15–19. The author does not believe that greater risk of infection can explain the greater male susceptibility. In the early years of life the environment of the two sexes is identical. He believes that enhanced susceptibility, or resistance, is an attribute of sex. *Norman White.*

PEREPEREZ Y PALAU, F. Evolución y estado actual de la endemia palúdica en el Delta del Ebro y provincia de Tarragona. [**Evolution and Present State of Endemic Malaria in the Ebro Delta and the Province of Tarragona.**] *Rev. Sanidad e Hig. Pública.* Madrid. 1944, Jan.–Feb., v. 18, No. 1, 52–74, 8 figs. [15 refs.]

The Ebro Delta till 1937 suffered little from malaria in spite of very intense anophelism for which some 14,000 hectares of rice-fields and market gardens were responsible [see this *Bulletin*, 1933, v. 30, 63]. The only *Anopheles* found are *A. maculipennis maculipennis* and *A. maculipennis atroparvus*, the former being the most abundant. Both are very markedly zoophile in the Delta. In 1930 the spleen rate was only 8. The disturbances caused by the civil war were followed by a marked increase in the malaria endemicity of the Delta, which increase is described in the present paper. Of the three antimalaria dispensaries in the region, at San Jaime de Enveija, Amposta, and La Cava, the first-named has worked most consistently and has the most complete records. In 1926, 430 malaria patients were seen in the dispensary of San Jaime; parasites were found in 197, comprising 124 *P. vivax*, 59 *P. malariae* and 14 *P. falciparum*. Thereafter the numbers declined year by year till 1937 when only 64 malaria patients were seen, in 32 of whom parasites were found, all *P. vivax*. In 1938 malaria incidence increased and a relatively high prevalence continued each year till 1942, when parasites were found in 1,070 of 1,789 cases, of which 7 were *P. falciparum*, the remainder *P. vivax* infections. The population served by the San Jaime dispensary is only about 3,500. No *P. malariae* infection has been found in this dispensary since 1931 and no *P. falciparum* between 1930 and 1942, when it reappeared. The total number of patients seen in the three dispensaries in 1942 was 4,804, in 3,565 of whom parasites were found. The total population of the area is about 20,000.

Relatively large migratory labour forces engaged in the rice fields in planting-time and harvest provide facilities for the transfer of malaria infection to other parts of the country. This fact endows the malaria problem of the Delta with more than local importance. Elsewhere in the Province malaria endemicity is low and its control presents little difficulty.

In the conditions pertaining in the Delta, anti-mosquito measures are hardly practicable. Reliance is placed on the early and thorough treatment of cases and the prophylactic use of anti-malarial drugs in certain places. Notable improvement was effected in the antimalaria service in 1943 and there was a corresponding improvement in the endemic situation. *Norman White.*

COLLIGNON. Zones paludéennes en Algérie et principes généraux de la prophylaxie. [**Malaria in Algeria: General Principles of Prophylaxis.**] *Bull. Office Internat. d'Hyg. Publique.* 1942, Apr.–May–June, v. 34, Nos. 4–5–6, 128–30, 1 map.

LEDENTU. Le paludisme en Afrique Equatoriale Française. [**Malaria in French Equatorial Africa.**] *Bull. Office Internat. d'Hyg.Publique.* 1942, Jan.–Feb.–Mar., v. 34, Nos. 1–2–3, 24–51, 1 map.

BOURGUIGNON, G. C. Le problème du paludisme dans la région d'Elisabethville. [**The Malaria Problem in the Elisabethville Region.**] *Rec. Travaux Sci. Méd. Congo Belge.* Léopoldville. 1944, Jan., No. 2, 165–203, 10 graphs.

The main part of this paper is concerned with the results of the examination of blood smears, from both Europeans and natives, sent to the laboratory, during a period of 9 years, for confirmation of the diagnosis of malaria which clinical symptoms had suggested. The total number of such examinations was 36,490. In the case of Europeans the number of positive findings is a very close approximation to the total incidence of malaria in Elisabethville. For the natives the figures are merely indicative of active malaria infection in a population heavily parasitized.

Climatic and malarial conditions are very different in the high Katanga plateau on which Elisabethville is situated from those prevailing in the central Congo basin. In Elisabethville there is a very well marked cold season with temperatures falling to freezing point, followed, about the beginning of November, by an equally well-marked rainy season. The rainy season continues till the end of March, with a remission at the end of January. The European part of Elisabethville is well separated from the native town, but as the majority of European households employ at least one or two native servants, who spend some hours each day in the native city, the segregation is not complete.

Graphs are produced showing the monthly incidence of positive malaria findings for Europeans and natives respectively in each of the nine years. There is a remarkable similarity between the curves of the different years. Each year malaria among Europeans is at its lowest ebb, sometimes almost absent, in the cold weather months, July, August and September. Clinically active native malaria is similarly lowest at this season but some cases continue to occur. From October onwards cases become progressively more numerous, though there may be no very marked rise in the European curve until February. The maximum incidence of native cases is generally in April; the maximum European incidence comes at least a month later.

Anopheles gambiae, *A. funestus* and *A. maculipalpis* appear to be important vectors of malaria in Elisabethville. *P. falciparum* is responsible for practically all the malaria. *P. malariae* is occasionally found in young native children but extremely rarely in Europeans. *P. vivax* has never been found except in native children under two years of age, and *P. ovale* has been seen only once. The gametocyte indices are surprisingly low, much lower than elsewhere in the Congo.

The trophozoites of *P. falciparum* in Elisabethville are for the most part characterized by their extremely small size, especially among the Europeans; they resemble *P. tenue* described by STEPHENS. Among the natives these small forms predominate in the cold season; with the advent of the rains and the concomitant increase in clinical manifestations of malaria the usual larger forms of trophozoites reappear. It would seem that the climate, altitude or seasonal anophelism is of a nature to influence the size of the trophozoites.

The paper contains the results of the blood examination of four groups of villagers in this south-eastern corner of the Congo, carried out in August toward the close of the cold season. The percentage of positive malaria findings was 68·6 as compared with 50 for Elisabethville. *Norman White.*

WATSON, R. B. & RICE, Margaret E. **Some Epidemiological Characteristics of Malaria in North Alabama as determined by Data collected over the Twenty-Year Period 1923–1942.** *Amer. J. Hyg.* 1944, Sept., v. 40, No. 2, 199–208, 5 figs.

Early in 1923 branch laboratories were established at Huntsville and Decatur to provide a diagnostic service for doctors practising in north Alabama. During 20 years these laboratories have examined 58,668 blood films, 82 per cent. of them from Morgan and Madison Counties in which the laboratories are situated. Thin films only were examined till 1933 in Decatur and 1938 in Huntsville. Since then thick films have been examined as a routine.

Routine collections of *A. quadrimaculatus* were begun in 1935, from approximately 150 collecting stations. Catches were made bi-weekly before the impoundage of Wheeler Lake, and weekly thereafter, from May to October, both inclusive, each year.

The percentage positive blood film findings are not strictly comparable. In the early years most of the films were from patients with fever. Later, doctors took films as a routine from all new patients, and some industrial plants require all new employees to be examined for malaria. But the figures show the trend of malaria incidence throughout the 20-year period and through each of those years.

Unusually severe outbreaks of malaria were experienced in 1923, 1929 and 1934; since 1934 the prevalence has decreased consistently. In 1923 the excessive prevalence was due almost entirely to *P. falciparum*; in all of the subsequent years *P. vivax* infections have been preponderant. *P. malariae* was found only three times during the 20 years.

Malaria incidence shows a marked rise from July to October, the month of maximum prevalence. The increase concerns both *P. vivax* and *P. falciparum* infections, but the former preponderates in every month. From February to May there is an increase in *P. vivax* infection rates, due to relapse of infections acquired some 7 months previously: *P. falciparum* infection rates decline during this period. There is a slight but well-marked decline of malaria incidence in June. The period of malaria transmission commences in June: the earliest date on which sporozoites have been found in mosquitoes was May 16th. In general, the highest seasonal level for anophelism was followed, 30 to 60 days later, by the highest malaria rate for the year. In certain areas anophelism has declined but there are other areas in the Tennessee Valley in which the production of *A. quadrimaculatus* has been most prolific, notably in 1941 and 1942. In spite of this there has been a rapid decline in malaria rates even in areas of excessive anophelism. Mosquito-proofing of houses may account for this in many places, but a decline has also been noted in places where no mosquito proofing has been done. It must be pointed out, however, that the statistical material used for the determination of infection rates hardly justifies dogmatic statements about fluctuations of malaria incidence from year to year.

Norman White.

ETHERINGTON, D. **Fertilization of *A. maculipennis* var. *labranchiae* in the Laboratory.** [Correspondence.] *Nature.* 1944, Nov. 11, 608.

Anopheles maculipennis var. *labranchiae* will swarm in a cage one metre high and fifty centimetres wide if a blue light of intensity 3 f.c. at 30 cm. is placed above the cage. It has also been carried completely round the life-cycle in a cage rather dimly illuminated from a window. *P. A. Buxton.*

CORRÊA, R. R. & RAMOS, A. S. Os anofelinos da ilha de Santo Amaro. [**Anophelines of the Island of Santo Amaro.**] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1944, Sept., v. 9, No. 22, 9–16, 2 figs. [11 refs.] English summary.

STOHLMANN, H. Malariaübertragung auf Blutspender. [**Transmission of Malaria to Blood Donors during Direct Transfusions.**] *Münch. med. Woch.* 1943, Jan. 29, v. 90, No. 5, 84–5.

Of five persons who gave transfusions to a soldier, infected with benign tertian malaria, three (two certainly and one probably) developed the disease. None of these three donors had been outside Germany. In the two cases in which observations could be made, the incubation period was 17 and 16 days respectively. The transfusions were given directly from donor to patient by means of Beck's apparatus, which is essentially a form of two-way syringe. Evidently there was some reflux of blood from the recipient to the donor.

[Direct transfusion is at present so little used that emphasis on the necessity of using an apparatus that makes impossible any reflux of blood from recipient to donor is not of very general interest. However, any information about the transmission of malaria by transfusion is of value because the spread of this infection from *donor* to *recipient* is likely to become increasingly common in the next few years ; it has been shown to occur even when the donor's blood is stored for some days (this *Bulletin*, 1942, v. 39, 252.)]

P. L. Mollison.

SOBERÓN Y PARRA, G. Intradermo-reacción que puede ser util en el diagnostico del paludismo. [**Intradermal Reaction for the Diagnosis of Malaria.**] *Rev. Med. Trop. y Parasit.* Habana. 1944, Mar.–Apr., v. 10, No. 2, 26–8, 1 fig.

The author describes an intradermal test for the diagnosis of malaria, which he considers may be of use in cases in which no parasites are found in the peripheral blood, for doctors in places in which there are no laboratory facilities, for the control of treatment, and in large-scale inquiries.

The reagent is made from the blood of a fowl very heavily parasitized with *Plasmodium gallinaceum.* Full details are given of the technique employed in the manufacture of the antigen, a technique which the author admits is capable of improvement. The intradermal injection of 1/10 cc. of the antigen, in the absence of malaria, is followed by an inflammatory reaction covering an area of one to one and a half centimetres in diameter, which reaches its maximum intensity in 9–12 hours ; thereafter it subsides and disappears in most cases within 24 hours. The absence of such reaction indicates malaria infection. In 242 cases of malaria, verified by blood examination, the test was indicative of such infection in 227 (93·8 per cent.). The test was applied to 837 patients suffering from a great variety of conditions. Cancer patients gave the most anomalous results ; 31 of 129 being positive. *Norman White.*

BOYD, M. F. & KITCHEN, S. F. **Renewed Clinical Activity in Naturally Induced Vivax Malaria.** *Amer. J. Trop. Med.* 1944, July, v. 24, No. 4, 221–34, 1 fig.

During ten years 388 white patients were successfully inoculated with *vivax* malaria by mosquitoes in the malaria therapy service of the Florida State Hospital ; of these, 375 experienced attacks of clinical malaria. Assuming that remissions of 5 or more days marked the end of the primary attack, 40·2 per cent. of 261 patients with spontaneous remissions, and 51·8 per cent. of 114 patients in whom remissions were induced by drugs, exhibited secondary clinical activity. No such renewed clinical activity was seen in patients whose primary attack exceeded 55 days, or 45 days before interruption by medication. After spontaneous remission 46·5 per cent. of the patients who received no subsequent therapy exhibited renewed clinical activity ; after induced remission the corresponding percentage was 73·0. None of 30 spontaneous remissions was

followed by secondary attacks when full therapy was given. Eight of 37 patients whose remissions were induced had secondary attacks in spite of full therapy. Full therapy means the administration of 14 gm. or more of quinine or of 1·5 gm. of atebrin, in divided doses. When the effect of treatment is the production of remission only, the duration of the remission tends to vary directly with the quantity of antimalarial drug given.

Few of the spontaneous remissions exceeded three weeks; the longest was 62 days, the mean duration being 11·1 days. The earliest secondary activity rarely exceeded three weeks, the mean duration being 6·9 days. The mean duration of induced remissions was 60·4 days, and of the subsequent clinical attack 7·7 days.

Most *vivax*-infected patients have quotidian intermittent paroxysms, due to successive and alternating maturation of two broods of parasites. It is suggested that remissions whose length is in odd-numbered days are terminated by the reactivation of the parasite brood, the suppression of which produced it. Remissions of 61 days or less were more frequently of an odd number of days in duration; the duration of longer remissions was more frequently of an even number of days.

Some of the attacks which terminated spontaneously were milder than those which were interrupted—a lower proportion were quotidian throughout. On reactivation, however, tertian fever was more commonly found in patients whose first remission had been induced by drugs; the drugs had not been equally deleterious to both broods of parasites.

The onsets of the renewal of clinical activity exhibit two frequency distributions. One is common to both spontaneous and induced remission cases. Here renewed activity of the primary parasitaemia may occur as long as 174 days after inoculation. Remissions occurring within this range of time do not mark the presumptive termination of the primary parasitaemia, and the attacks might well be termed recrudescences. On the other hand activity observed only after therapeutic interference arising after the 204th day is probably not related to the primary parasitaemia; it might be aptly termed relapse.

Norman White.

BOYD, M. F. **On the Parasite Density prevailing at certain Periods in Vivax Malaria Infections.** *J. Nat. Malaria Soc.* Tallahassee, Fla. 1944, Sept., v. 3, No. 3, 159–67.

This study is based on observations made on 307 adult white patients with naturally induced *vivax* malaria. The parasite density on the day of onset, the first day with temperature of 100°F., varied considerably. In 16·9 per cent. of the patients no parasites were detected in the peripheral blood on the day of onset; in 61·2 per cent., the parasites did not exceed 100 per cmm.; in 7·2 per cent. the parasite density exceeded 1,000 per cmm. None of the onsets occurring within 14 days of inoculation had parasite densities exceeding 500 per cmm.; all onsets occurring more than 20 days after inoculation were accompanied by parasite densities of 10 to 10,000 per cmm. The parasite density at onset increased as the interval between the end of the prepatent period and the onset increased.

Sixty per cent. of the patients had parasite densities exceeding 1,000 per cmm. when the temperature first reached 104°F. The longer after inoculation this event occurred the higher the coincident parasitaemia.

Clinical activity usually terminated spontaneously with a parasite density of 1,001–5,000 per cmm. In some patients, however, the terminal density was lower than that which initiated the attack. The density on recrudescence or relapse was generally higher than it was at the primary onset, but in some cases

the density was substantially the same, or even lower. The densities did not appear to become progressively higher with later reactivations.

Norman White.

APPLEBAUM, I. L. & SHRAGER, J. **Pneumonitis associated with Malaria.** *Arch. Intern. Med.* 1944, Sept., v. 74, No. 3, 155–62, 5 figs. [21 refs.]

This paper starts with references to the extensive literature on the association of malaria with pneumonia, and to the undecided question whether or not there is a malarial pneumonia. The authors report observations upon 125 consecutive patients with pneumonia associated with malaria, who were admitted to the Gorgas Hospital, Panama, between January 1942 and May 1943. Seventy per cent. of the patients were white men of military age. Among such men the incidence of pneumonia associated with malaria was 3·7 per cent. of the incidence of uncomplicated malaria. The cases were most numerous during the rainy season when both malaria and pneumonia are most prevalent. *P. vivax* and *P. falciparum* infections were associated with pneumonia to about the same extent. X-ray examination showed that the lower lobes of the lung were most commonly affected and that the lesions were of the lobular type. The combined disease was not severe. The average stay in hospital was 17½ days, only slightly longer than that for uncomplicated pneumonia or malaria. There was only one death; this was caused by cerebral malaria and the pneumonia was not thought to have contributed to the fatal issue. One group of cases responded to sulphonamide compounds. In 38 of 50 patients the pneumonia yielded to the administration of antimalarial drugs alone. Some cases showed an inadequate response to both forms of treatment but ran a self-limited course. The sputum of 62 patients was examined; in 55 no pathogenic organisms were isolated. Pneumococci were found in 5, haemolytic streptococcus in one, and *Staphylococcus aureus* in one.

Norman White.

HARRISON, K. S. & DAKIN, W. P. H. **Nephrotic Type of Nephritis in association with Quartan Malaria.** *Med. J. Australia.* 1944, July 22, v. 2, No. 4, 90.

A female native child five years of age was admitted to hospital in a south-west Pacific island with oedema of legs, vulva and lower part of back, ascites, and puffiness of face and eyelids. The spleen extended two inches below the costal margin. There was a small pleural effusion at the base of each lung. When the scanty urine was boiled, three-quarters of its volume was albumin; there were numerous granular, cellular and hyaline casts and a few red blood cells.

Plasmodium malariae was found in the blood. There were numerous hookworm ova in the faeces. Antimalarial treatment, quinine, atebrin and plasmoquine, in succession, caused the disappearance of the more acute symptoms. Then the hookworm infection was treated with carbon tetrachloride. Convalescence was complicated by a secondary yaws eruption which yielded rapidly to mapharsen, after which the patient contracted influenzal pneumonia which responded to sulphathiazole. The patient eventually recovered. It is not certain that quartan malaria was responsible for the nephrosis in this case, but the association of the two conditions has been reported from many places, though not hitherto, the authors believe, from the south-west Pacific.

Norman White.

MANSON-BAHR, P. **The Nature and Treatment of War-Time Malaria Relapses in England.** *Med. Press & Circular,* 1944, Nov. 29, 342–7.

Malaria relapses among troops returned from Africa and Mediterranean countries are occurring in many parts of Britain. To many practitioners these

cases present novel problems ; and this article was written for their benefit. The multiplicity of malaria treatments recommended is often a source of confusion. A table outlines, in schematic form, 26 such treatments.

A description is given of the chief characteristics of benign tertian and malignant tertian malaria. Relapses of the former will be most frequent in this country.

For cases where quinine is to be given intramuscularly, a new preparation, *solvochin*, is considered superior to other preparations. Solvochin is a 25 per cent. solution of quinine in phenyldimethyl-pyrazolon. Its reaction is alkaline, *p*H 7·2. It causes no local irritation. The recommended dose, 2·2 cc., contains 0·5 gm. (7½ grains) of quinine. The treatments advised are :—

Benign tertian, severe cases with numerous parasites ; two intramuscular injections of 2·2 cc. solvochin daily for two days, 30 grains quinine hydrochloride daily by mouth for the next two days, then 20 grains quinine hydrochloride by mouth daily for five days. In less severe cases the intramuscular injections can be omitted. This treatment of the acute attack is followed by suppressive anti-relapse treatment consisting of : pamaquin 0·04 gm. and 7½ grains of quinine daily for seven days, which course should be repeated after four days' interval. If well tolerated four or five such suppressive courses can be given.

Malignant tertian, severe infections with numerous parasites ; two intramuscular injections of solvochin, 2·2 cc., daily for four days then mepacrine, 0·1 gm. and quinine hydrochloride 10 grains thrice daily for seven days. After five days' interval the mepacrine and quinine course should be repeated. Two further mepacrine and quinine courses at weekly intervals are recommended for anti-relapse treatment. In less severe cases the intramuscular treatment is not necessary. *Norman White.*

Rico, B., C. La "Calgluquina." Sandoz en el tratamiento del paludismo. [**"Calgluquina" Sandoz in the Treatment of Malaria.**] *Medicina.* Mexico. 1944, Aug. 10, v. 24, No. 465, 317–21.

"Calgluquina" Sandoz is gluconate of quinine in a solution of glucono-galacto-gluconate of calcium ; 10 cc. contain 0·6 gm. of quinine gluconate. Its *p*H is 7. On intramuscular injection it causes none of the severe local reactions associated with most quinine preparations, and the quinine is completely absorbed. It is a safe preparation for intravenous administration. The calcium inhibits anaphylactic shock and increases the tolerance of the organism for quinine ; it also reactivates chronic infections, rendering the parasites accessible to the quinine. The preparation has cardio-tonic properties. For the treatment of acute attacks in adults two intravenous injections a day, each of 5 cc., are recommended ; for chronic cases 5 cc. a day, intravenously. In acute cases the treatment can be continued for 8 to 10 days. Intramuscular injections are recommended for children, in diminished doses according to age. The author has noted no toxic effects from the use of "Calgluquina" and has found it to be of great value in cases that failed to respond to other antimalarial drugs. He describes four chronic and one acute case of malaria which were successfully treated with intravenous "Calgluquina". *Norman White.*

Das Gupta, B. M., Siddons, L. B. & Chakravarti, H. **Quinine and** *Alstonia scholaris* **(Chhatim) in Malaria. A Study of possible Synergy.** *Indian Med Gaz.* 1944, Sept., v. 79, No. 9, 408–14, 2 charts.

Recent work has discounted the former belief that the alkaloids contained in the bark of *Alstonia scholaris* (chhatim) were of value in the treatment of malaria. The present report gives no support to the view that chhatim given in

combination with quinine enhances the antimalarial activity of the latter drug. Seventeen patients suffering from malaria were the subjects of the investigation. They were all adult or adolescent male Bengalees. There were two *P. malariae* infections; the remainder were *P. falciparum* or *P. vivax* or both, ten being mixed infections. Most of the cases were of several weeks' duration, that is to say low grade residual infections such as are commonly seen at the end of the transmission season. Eight patients were treated with two grains of quinine sulphate thrice daily for six days. Nine patients received the same doses of quinine reinforced with 12 grains of powdered bark of *Alstonia scholaris*, thrice daily for six days. There was no significant difference between the results obtained in the two groups. These very small doses of quinine controlled both fever and parasites in most cases but relapses after short intervals were the rule. The conclusion is that such small doses are not justified; they would be dangerous in early *P. falciparum* infections. *Norman White.*

BRAHMACHARI, U. **Berberine in Malaria. A Preliminary Note.** *Indian Med. Gaz.* 1944, June, v. 79, No. 6, 259.

The author states that berberine sulphate has the property of driving malaria parasites from the internal organs into the peripheral circulation where they can be readily attacked by quinine. This observation he ascribes to CHOPRA. It is contended that berberine sulphate should be a valuable adjuvant to quinine in the treatment of malaria. Its toxicity is low and it can be safely administered intravenously. No clinical observations are produced in support of the suggestion. [See also this *Bulletin*, 1933, v. 30, 42]. *Norman White.*

HIATT, E. P. **Plasma Concentrations following the Oral Administration of Single Doses of the Principal Alkaloids of Cinchona Bark.** *J. Pharm. & Exper. Therap.* 1944, June, v. 81, No. 2, 160–63, 2 figs.

The alkaloids were given orally to healthy volunteers three hours after breakfast, the dose being 10 mgm. of free base per kgm. body weight, *i.e.* 0·6 gm. or about 10 grains for a 9½ stone man. The concentration of the different alkaloids in the plasma of the individual volunteers is shown in a series of graphs. There was considerable variation between different individuals but the peak was usually reached after 2–3 hours. For quinine the average value was about 3 mgm. per litre, for quinidine about 2 mgm., for cinchonidine about 2·5 mgm. and for cinchonine about 0·5 mgm. After 24 hours the concentration of the first three alkaloids was about 0·2–0·8 mgm. per litre, while cinchonine could not be detected. If totaquina (U.S.P.) was given [3 subjects] the concentration of total alkaloids in the blood showed an average value comparable with those of the individual alkaloids. *F. Hawking.*

SIEGEL, H. & MUSHETT, C. W. **Structural Changes following Administration of Quinacrine Hydrochloride.** *Arch. Pathology*, 1944. Aug., v. 38, No. 2, 63–70, 5 figs. [13 refs.]

Pathological results of quinacrine treatment have been described in papers abstracted in this *Bulletin*, 1934, v. 31, 171, and 1944, v. 41, 99 and 649. The present investigation is part of a general study of the effects of quinacrine (atebrin dihydrochloride) in experimental animals, in which 25 dogs, 20 monkeys, 50 chickens, 20 hamsters, 20 guineapigs, 20 rabbits and 400 rats were used. All the animals received an adequate diet without stint, and were housed in good conditions. The drug was administered in 3 per cent. solution by stomach tube, the doses given being calculated as a percentage of the LD50, which is

900 mg. per kilo. for rats. The tissues for examination were generally fixed in formalin and stained with Delafield's haematoxylin and eosin, but other methods of fixing and staining were sometimes employed. The rat was found to be the most suitable animal for demonstrating in a general way the tissue changes which occur as the result of treatment with quinacrine, and detailed descriptions of the results are given for this animal, but cannot be fully abstracted.

After a single LD50, a basophilic substance was present in cells of the reticuloendothelial system, and in certain parenchymatous cells. It was shown to be quinacrine or some closely related substance. Large areas of the liver as well as smaller foci showed coagulative necrosis, generally accompanied by only slight inflammatory reaction. From 4 to 8 weeks after recovery from this dosage the rats appeared to be in normal health, but the livers of some had depressed scars, mostly of the right lobe, and were adherent to adjacent structures. The fact that this lobe was chiefly affected was shown by analysis not to be due to a greater concentration of the drug at that site. After the same period following smaller doses, the changes in the liver were no longer visible. In spite of the extensive liver damage sometimes encountered, no evidence of a haemorrhagic diathesis was noted. Besides those in the liver, pathological changes were found in the heart, adrenal gland, kidney, spleen, reticuloendothelial system, stomach and occasionally in striated muscle, with lesser changes in other tissues after a single LD50. The outward appearance of the test animals, as well as the accompanying histological changes in their tissues after smaller repeated doses, are described. Massive haemoglobinuria was induced only in young rats receiving a particular dosage of drug, and at times acute catarrhal enteritis and colitis occurred.

Deaths amongst animals receiving small doses of quinacrine over a long period were paralleled to some extent in the controls, and it was not clear whether the drug rendered the animals more prone to natural infections, which occurred mostly in the lungs.

A brief description of results obtained with the animals other than rats is given. Myocardial lesions occurred only in hamsters, while liver necrosis in dogs was rare. *J. D. Fulton.*

ROY. NAV. MED. BULL. No. 13, 14–19. **Malaria—Recommendations for Suppressive Treatment (Chemoprophylaxis).** [Reprinted from U.S. Navy Dept. BUMED News Letter, Vol. 4, No. 1.]

Suppressive treatment with atabrine [mepacrine] is recommended for naval personnel who are exposed to malarial infection. One tablet of 0·1 gm. (1½ grains) should be taken daily at the evening meal. This routine should be continued throughout the period of exposure to infection, and for a month afterwards; if, however, there is a high incidence among the men, this suppressive treatment should be continued while they are in the theatre of war whether based on a malarious or a non-malarious area.

In some persons mepacrine causes nausea and vomiting or colic and diarrhoea, but this is an initial intolerance, often due to taking the drug on an empty stomach or in too large a dose; temporary reduction of the dose leads to tolerance, and less than one per cent. of persons are unable to continue taking it.

The routine should be modified in certain circumstances: when clinical attacks occur they are treated and the suppressive doses are resumed afterwards; if the incidence of clinical attacks is high, say after return from strenuous combat, it may be reduced by increasing the daily suppressive dose to three tablets (0·3 gm.) daily after meals for 3–5 days, and then returning to 0·1 gm. a day as before.

Suppressive treatment should be begun a month or two before arrival at a place where it will be required; in other places different measures of control may have made suppresive treatment unnecessary, so information about the area should be obtained beforehand.

A certain level of concentration of the drug in the blood is required before suppressive treatment becomes effective, as the tissues have first to be saturated; half the maximum concentration is reached in a week and the maximum in four weeks. In urgent circumstances of war it may be necessary to give 0·2 gm. daily for a week so as to establish a higher plane of concentration for a time as a safeguard against unavoidable irregular administration.

There is no evidence of toxicity from long continued dosage, *e.g.*, over a year, and fears that it produces impotence or sterility are unfounded.

J. F. Corson.

ROMERO MOLINER, R. Profilaxis del paludismo tropical con atepe y con quinina. Resultados y critica. [**Prophylaxis of Tropical Malaria with Atepe and with Quinine.**] *Med. Colonial.* Madrid. 1944, June 1, v. 3, No. 6, 366–72, 2 graphs. [16 refs.]

A military detachment was stationed in small groups along an intensely malarious coast line of Fernando Po. Men suffering from malaria were treated in the military hospital at Concepción. The composition of the detachment was unchanged throughout the period of observation. The men from the date of their arrival in the colony were each given a daily dose of 0·4 gm. of quinine sulphate. From May 1943 onwards this quinine prophylaxis was closely supervised and is believed to have been complete, in spite of which malaria incidence was high. The peak of the incidence curve was during the first ten days of August when 48 cases occurred. On the 10th August the quinine prophylaxis was replaced by atepe, two tablets on each of two successive days each week. [A tablet of atepe contains atebrin 0·1 gm. and plasmoquine 0·005 gm.]. Thereafter there was a remarkably lowered incidence of malaria, which continued through September and October. This is the rainy season which is usually a most unhealthy period of the year. All the malaria in this area is due to *P. falciparum.*

Norman White.

WHITE, R. Senior & VENKAT RAO, V. **Regulation of the Control of Anopheles of the *Fluviatilis*-Group by Anti-Adult Spraying.** *Indian Med. Gaz.* 1944, Aug., v. 79, No. 8, 364–9, 1 fig.

The *fluviatilis* group consists of *A. fluviatilis*, *A. varuna* and *A. minimus*. All three species are potent malaria transmitters in India, and *A. minimus* has a wide dispersion in Burma, Southern China and French Indo-China. The habits of adult *A. minimus* have been studied by Muirhead THOMSON [this *Bulletin*, 1942, v. 39, 597, where other references are given]. He found that *A. minimus* takes two days to digest its blood meal in the hot monsoon season and lays its eggs on the second night after feeding; in cold weather this period is increased to 4–6 days. Most *A. minimus* leave the house toward sundown; there is no similar attraction towards light at dawn. There is a considerable daily turn-over of the *A. minimus* population in houses. About 90 per cent. of blood feeding takes place after midnight. After oviposition *A. minimus* returns for another blood meal on the same night. In fertilized females one blood meal is sufficient for egg laying.

The first-named author of the present paper has for two years been carrying out experiments to extend Thomson's work and to observe the effects of spraying on the numbers and behaviour of 8 species of *Anopheles*, including all three

members of the *fluviatilis*-group. These observations are not yet ready for publication but the findings, in so far as they concern the control of *Anopheles* of the *fluviatilis*-group by spraying, are made available without delay in view of the shortage of supply of insecticidal sprays. He has found that in a house "caught to emptiness" daily, 96 per cent. of *A. fluviatilis* and *A. varuna* and all *A. minimus* are fresh fed the next morning. If this catching to emptiness be carried out but once a week 82 per cent. of *A. fluviatilis* and *A. minimus* and 94 per cent of *A. varuna* are fresh fed. The number of all three species found resting in empty houses is only from 11 to 15 per cent. of the number found in inhabited houses. In a house occupied only by a cow the number of *A. fluviatilis* is 16 per cent., of *A. minimus* 50 per cent. and of *A. varuna* almost 100 per cent. of their numbers found in a similar house with human "bait." Most of the *A. varuna* caught near cattle, 67 per cent., were only resting there after a recent meal on human blood. Daily spraying reduces the number of old, potentially infective, individuals (wing stages III and IV) by 71 per cent. in *A. fluviatilis* and to *nil* in *A. varuna*. It halves the total numbers of *A. fluviatilis* and *A. varuna* but reduces the number of *A. minimus* by only 27 per cent. Once-a-week spraying reduces the number of "old wings" by 66 per cent. in *A. fluviatilis* and by 38 per cent. in *A. varuna*. (The numbers of "old wing" *A. minimus* captured were too small to apply this criterion.) The numbers of all three species found resting in houses sprayed once a week were actually greater than in exactly similar unsprayed houses. This curious phenomenon was not found with *A. culicifacies* in the same houses, so is not explained by attractiveness of bait; it is not understood.

There is in all three species an almost complete daily turnover of the individuals in a house; insects which have fed one night have left the next. Departures are not delayed by lowered temperatures, though digestion is. Individual mosquitoes are thus vulnerable to spraying for only one daylight period in each digestion-ovarian cycle.

The rationale of spray control is to destroy the mosquito before it becomes infective. Taking into account the length of the sporogony cycle this means that in the monsoon the mosquito must be destroyed before the 9th day, in the autumn before the 10th day and in the cold weather before the 14th day. These periods vary, of course, in different localities. The authors suggest various spacing of spraying which will ensure that any given mosquito will run two chances of being hit before its glands become infected.

To illustrate the results of spraying six days a week the observations in Gua, Singhbum Hills, are quoted. Thirty sprayed railway quarters were compared with 30 adjacent unsprayed quarters. Figures for once-weekly catches over 26 months, for all three species, were: unsprayed quarters, 1,112 mosquitoes with oöcyst rate of 4·7 and sporozoite rate of 3·5; sprayed quarters, 46 mosquitoes with oöcyst rate of 4·3 and sporozoite rate of 2·2. The density was therefore reduced 24 : 1, and it is by this reduction that malaria control is achieved. In Posoita, Singhbhum, mosquito density was reduced 6 : 1 by intermittent spraying—2 days spray, 2 days no spray, 1 day spray, 2 days no spray, 2 days spray; this rhythm was repeated after 2 days no spray In the cooler weather from mid-October onward, when the digestion cycle is 72 hours, the rhythm was changed to 3 days spray, 4 days no spray, and so on. In this station the incidence of malaria was but 2 per cent. higher than in previous years when daily sprayings were employed.

If daily spraying be done with kerosene alone there is a greater reduction in the number of mosquitoes caught than if daily spraying be done with pyrethrum-kerosene mixture. It is not known whether the repellent action of kerosene prevents the entrance of mosquitoes to bite, or only their remaining to rest after biting.

The conclusions arrived at apply only to the control of the *fluviatilis*-group. *A. culicifacies* can be adequately controlled by weekly, or at most bi-weekly, spraying. *Norman White.*

WASICKY, R. & UNTI, O. Dicloro-difenil-tricloro-etano (DDT) no combate às larvas de culicídeos. [**Dichlor .Diphenyl Trichlorethane (D.D.T.) in the Campaign against Mosquito Larvae.**] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1944, May, v. 9, No. 21, 89–102. English summary.

The authors report on the value of DDT against mosquito larvae. The bulk of their work has been done with the material dispersed in colloidal form through the water (the method of dispersal not being stated).

Working in aquaria it is found that a dilution of 1/10,000,000 kills mosquito larvae in 30 to 60 minutes, 1/50,000,000 in 24 to 36 hours. No difference is recorded between larvae of *Anopheles albitarsis*, *A. strodei* and *Culex*.

A single application is effective in an aquarium for four months, death of larvae requiring a longer exposure as time passes. The material is not repellent to female mosquitoes, and does not kill mosquito eggs.

Large scale applications are described, *e.g.*, a swimming bath which contained numerous larvae of five species of *Anopheles*, and also Culicines. The surface was treated with a dosage corresponding to 1/25,000,000 throughout the bath, and all larvae were killed : none reappeared for twenty days.

Experiments are briefly described in which the DDT is used as a larvicide in mineral oil, or absorbed on cork powder.

A series of experiments are described in which DDT was administered by various routes to experimental animals of several sorts. The authors are convinced of its " complete systemic atoxicity." Ointments and colloidal solutions containing as much as 5 per cent. do not cause irritation of skin or conjunctiva. *P. A. Buxton.*

ROZEBOOM, L. E. & HESS, A. D. **The Relation of the Intersection Line to the Production of** *Anopheles quadrimaculatus*. *J. Nat. Malaria Soc.* Tallahassee, Fla. 1944, Sept., v. 3, No. 3, 169–79, 2 figs.

A. quadrimaculatus breeding is confined to waters containing vegetation and floatage. In determining the suitability of water for the production of this species the " intersection line " is of value. This is defined as " the line of intersection between three interfaces, water-air, water-plant, and plant-air". " Intersection value " is " the number of meters of intersection line per square meter of water surface."

" A square wooden frame one-half meter on a side and about eight inches deep was used as the standard sampler. This was placed among the plants, and the collector, standing above it, looked down and estimated the percentage of the water surface that was covered by the vegetation and the amount of intersection line, within the area enclosed by the frame. Except for lotus, the amount of intersection line in each sample was recorded as high, medium, low or zero, the latter group including some samples which contained a small amount of intersection line." In the case of lotus, absolute measurements were made with a flexible steel tape. Egg and larva collections were made by skimming the surface of the water within the frame with a cup.

Studies were made of eight species of littoral plants in the North Alabama section of the Tennessee Valley, representing five ecological types : submerged, grass-like, leafy-emergent, naked-emergent, and floating-leaved. It was found that with individual plant species there is a close positive correlation between the production of *A. quadrimaculatus* and the amount of intersection line per

unit of water surface area. The increased mosquito production which accompanies high intersection values is due to increased oviposition and decreased larval mortality. The only exception occurred in dense stands of *Eleocharis quadrangulata*, a naked emergent type of plant which appeared to present a mechanical barrier to anopheline oviposition. *Norman White.*

HESS, A. D. & KIKER, C. C. **Water Level Management for Malaria Control on Impounded Waters.** *J. Nat. Malaria Soc.* Tallahassee, Fla. 1944, Sept., v. 3, No. 3, 181–96, 4 figs.

This paper describes the water level management on impounded waters of the Tennessee Valley Authority with particular reference to malaria control. Such management is effective in so far as it secures a clean water surface which will not produce *A. quadrimaculatus.* Success demands attention to accessory measures including (1) proper reservoir preparation—reservoir clearance, marginal drainage and reconditioning of the zone of fluctuation; (2) winter time impoundage; (3) shoreline maintenance—annual shoreline conditioning, aquatic growth control, marginal grazing and drainage maintenance; (4) permanent shoreline improvement.

On the nine main river reservoirs of the Tennessee Valley Authority water level management has regard to their three main purposes, navigation, flood control and the generation of hydro-electric power. Some time during the winter or early spring the water is brought up to the maximum flood surcharge level and is subsequently brought back to the normal maximum summertime level. This results in the stranding of drift and floatage which might otherwise favour mosquito breeding later on. It is important that water should not be left at the maximum flood surcharge level after the beginning of the spring growth period, about April 1st in the lower valley, as it might kill timber in the uncleared zone, and dead timber adds to the accumulation of drift and floatage. After the first half of May such flood water might cause uncontrollable breeding of *A. quadrimaculatus.*

A relatively constant water level, at the normal maximum summer level, is maintained, from the period of early spring growth to the beginning of moderate *A. quadrimaculatus* production, from about April 1st to almost the end of May; this period may be two weeks or so later in the northern part of the area. This constant water level phase prevents the invasion of marginal vegetation into the zone of fluctuation. Seeds of the annual plants that grow in that zone will not germinate until they are "dewatered" and woody species remain dormant until the buds are exposed to the air. Thus the constant water level phase reduces the amount of subsequent vegetation. It has also been found to be highly beneficial to fish.

The third phase is that of weekly cyclical fluctuations, from the beginning of moderate *A. quadrimaculatus* production in the latter half of May till the beginning of heavy production of the species about July 1st. This cyclical fluctuation should have an amplitude of about one foot. The withdrawing of water from the marginal band of vegetation once a week eliminates the "intersection line" (see ROZEBOOM & HESS above) and provides a clean shoreline.

The fourth phase is the combination of a seasonal recession of approximately one-tenth of a foot a week with the regular weekly cycle of fluctuation.

The need for specially controlled water levels for malaria control on the main river reservoir ends about October 1st, the end of the *A. quadrimaculatus* breeding season.

In the Authority's reservoirs, other than main river reservoirs, water level management is by seasonal recession alone or by cyclical fluctuation alone.

These impounded waters on the whole present less difficult mosquito control problems than do the main river reservoirs. *Norman White.*

KRUSE, C. W., HESS, A. D. & METCALF, R. L. **Airplane Dusting for the Control of *Anopheles quadrimaculatus* on Impounded Waters.** *J. Nat. Malaria Soc.* Tallahassee, Fla. 1944, Sept., v. 3, No. 3, 197–209, 4 pls.

The Tennessee Valley Authority is making increasing use of airplane dusting with Paris green for the control of *A. quadrimaculatus* breeding in its impounded waters. Next season five dusting airplanes will be in operation. In this paper the authors describe the improvements that have been effected in the technique since the last report on the subject was published. A detailed description is given of the airplane, the dust hopper, agitators, release valve and other special equipment. Methods of calibrating the rates of discharge are described.

The dusting flying height is usually 20 to 30 feet ; the operation is carried out during the calm period of early morning. About 20 per cent. of the Paris green falls within the central 100 feet of the dusting swath, and 8 per cent. in the second 100 feet. The remainder drifts away and is lost. The torque of the airplane propellor causes the dust distribution curve to be skewed to the left.

A suggested revision of the specifications for Paris green for use in airplane dusting is : " At least 95 per cent. shall pass a 200 mesh screen and at least 85 per cent. shall pass a 325 mesh screen : at least 75 per cent. shall consist of particles 20 microns or greater in diameter (all percentages are by weight)." The finer the particles the more toxic is Paris green to *Anopheles* larvae, but when applied by airplane a slight breeze will cause the particles to drift away if they be too fine. *Norman White.*

BISHOP, E. L. & GARTRELL, F. E. **Permanent Works for the Control of Anopheline on Impounded Waters. (A Preliminary Report with particular reference to the Kentucky Reservoir of the Tennessee Valley Authority.)** *J. Nat. Malaria Soc.* Tallahassee, Fla. 1944, Sept., v. 3, No. 3, 211–19, 2 figs.

The Kentucky reservoir which was scheduled for impounding in 1944 is the last and by far the largest main river reservoir of the Tennessee Valley Authority's grandiose project. It will be 184 river miles in length with an average breadth of at least 2 miles. In the central part of the reservoir water might inundate the broad flat alluvial floodplain to a shallow depth : this would produce favourable conditions for *A. quadrimaculatus*. Experience gained in connexion with the Wheeler reservoir, where the usual larval control measures have proved costly and incompletely effective, indicated the desirability of incorporating permanent works for anopheline control in the overall construction plans for the Kentucky reservoir. This has been done. The scheme is outlined in this interesting paper. It includes diking and dewatering, deepening and filling, restriction of land use to daytime occupancy, marginal drainage and house mosquito-proofing in a few areas. All this work is in progress or completed. By the coordination of malaria control plans with the overall plan for the reservoir it has been possible to effect savings in the capital investment essential for permanent shoreline improvement. For example a substantial economy was effected in highway and railroad relocation fills ; lower cost construction was possible behind the embankment built to restrict mosquito breeding areas. The complete larvicidal and shoreline maintenance programme that would have been necessary, had not these permanent works been undertaken, would have cost twice as much as the estimated cost of upkeep of the completed scheme. Moreover, the permanent shoreline improvement scheme will provide much more effective mosquito control. *Norman White.*

RECTOR, N. H. **Selection of Anti-Mosquito Methods to fit Specific Malaria Control Programs.** *J. Nat. Malaria Soc.* Tallahassee, Fla. 1944, Sept., v. 3, No. 3, 221–6.

This is a summary description of the various malaria control methods and an insistence on the necessity of making a comprehensive malaria survey before embarking on a malaria control programme. *Norman White.*

BARRETO, M. P. Malária experimental: algumas de suas contribuições para o conhecimento da infecçao malárica no homem. [**Contribution made by Experimental Malaria to Knowledge of Human Malaria Infection.**] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1944, May, v. 9, No. 21, 4–49, 1 fig. [Bibliography.]

The author has successfully undertaken the formidable task of summarizing the important contributions that have been made by malarial therapy to our knowledge of human malaria and the observations on animal malaria that are concerned with the exo-erythrocytic cycle of development of the malaria parasite. The bibliography contains more than 240 references, most, if not all, of which have been duly summarized in the pages of this *Bulletin.*

Norman White.

TZE-TUAN CHEN. **The Nuclei in Avian Malaria Parasites. I. The Structure of Nuclei in *Plasmodium elongatum* with some Considerations on Technique.** *Amer. J. Hyg.* 1944, July, v. 40, No. 1, 26–34, 33 coloured figs. on 2 pls.

The author has studied the structure of the nuclei in various stages of development of *Plasmodium elongatum* in canaries and ducks. Films of the blood were fixed in Flemming's fluid modified in such a manner that swelling and destruction of the blood cells was avoided. Staining was carried out by Feulgen's method, and light green was used as a counter stain. There resulted a sharp contrast between the crimson nuclei and the green cytoplasm of the cell and parasite. The resting nuclei were fairly uniform in character, appearing as rings which should probably be interpreted as spheres. In the dividing nuclei of schizonts purple bands appeared and it is thought that these may represent chromosomes. The nuclei of the gametocytes were less distinctive. The findings, which are the same in the two hosts, are illustrated in two coloured plates. *C. M. Wenyon.*

BLACKWATER FEVER.

SHIRCORE, J. O. **A Case of Blackwater Fever in an African Girl.** *Trans. Roy. Soc Trop. Med. & Hyg.* 1944, Nov., v. 38, No. 2, 161–2.

An African girl, born in Dar-es-Salaam, had a first attack of blackwater fever when 7 years old, a second attack at 9 years, and a third attack, reported in this paper, at the age of twelve years.

The present attack began on May 23rd, 1944, and the patient walked to hospital next morning. When first seen by the author her temperature was 104°F., but she complained only of headache and slight pain in the loins which lasted for a few days. The urine was porter-coloured for four days, then became a light portwine colour until June 1st. Her blood showed a few coarse rings which were diagnosed as *Plasmodium malariae.*

She was treated by Hearsey's method [sodium bicarbonate and perchloride of mercury] and received also 1·875 gm. of mepacrine, including an intramuscular injection of 0·375 gm., during four days. The temperature fell by lysis

to 99·4°F. on the 4th day, rose to 102°F. on the 7th and 8th days, then fell by lysis to normal on the 12th day. She was discharged well on June 24th.

The urinary deposit was stained and examined for bacteria and a heavy infection was found, the predominant organism being a streptococcus in chains of 25 to 30 cocci. This was treated with sulphapyridine, 0·5 gm. t.i.d., on May 28th and 29th with no apparent effect on the streptococci; then sulphathiazole was substituted on June 1st and within three hours the blackwater cleared and gradually became normal and free from streptococci.

The author regrets that he never examined the stained urinary deposit for bacteria in any of the 102 cases of blackwater fever which he has treated. He thinks that infection of the renal pelvis with haemolytic streptococci may be the cause of blackwater fever or at least be a contributory factor. [G. R. Ross (Researches on Blackwater Fever in Southern Rhodesia, *No. 6 of the Memoir Series of the London School of Tropical Medicine, 1932*, 196; this *Bulletin*, 1932, v. 29, 589) found streptococci in the majority of the urines examined but regarded their significance as doubtful "since they are also found in non-catheter specimens in other conditions with considerable frequency." Holm (this *Bulletin*, 1942, v. 39, 670) reported a dramatic recovery after treatment with sulphanilamide of an apparently moribund blackwater fever patient.]

J. F. Corson.

TRYPANOSOMIASIS.

Jackson, C. H. N. **The Analysis of a Tsetse-Fly Population. II.** *Ann. Eugenics.* 1944, Oct., v. 12, Pt. 3, 176–205, 6 figs. [13 refs.]

This paper continues the treatment of data from the marking and recapture of tsetse-flies (*Glossina morsitans*) at Kakoma, Tanganyika Territory, from 1935 to 1940, when the work was stopped [see this *Bulletin*, 1941, v. 38, 307]. All the recapture data are published, together with meteorological observations for nearly six years.

Earlier conclusions on dispersal are confirmed—that dispersal is largely a coming and going within "ambits" governed by vegetational boundaries, and that, because of this and of random returning, the average effective distance travelled by a fly in its whole life is probably under half a mile in any one direction. It is also pointed out that, for individual flies recaptured more than once, the distance covered tends to be greater between the two last recaptures than between the early captures. It is conjectured that flies making longer flights may do so because they have not readily found food, and that a proportion of such individuals fail to discover food in time, and are not therefore recaptured again. [However, another explanation might be that older flies travel more freely.]

As there is some suggestion that the painting shortens life, the estimated birth and death rates should be regarded as comparative only, pending the conclusion of further investigations still proceeding. An improvement has been made in the mathematical treatment, which depends on the fact that the proportionate loss by death and dispersal of flies from any week of marking to the first week of recapture, can be considered as approximately equal to the observed proportionate fall (which occurs in the same period) in recaptures of flies from the *previous* week of marking, made respectively one and two weeks after it.

The bi-monthly estimates of birth and death rates are always very high in hot dry weather, but in three years out of six they rise also in part of the rainy

season. The estimated birth rate shows some agreement with the proportion of young flies in the catch of males, and the death rate agrees with the proportion of females in the catch of flies not recognizably young. Further evidence is given that females live substantially longer than males.

Monthly estimates of log. population are moderately well correlated with observed log. density-activity ($r = +0{\cdot}7$), and when numerous inherent sources of error are considered there remains little doubt that density-activity reflects changes in true density rather than in activity. It appears that a catch of one "old" (not recognizably young) male fly per 10,000 yards represents a population of some $7\frac{1}{2}$ "old" males per square mile, and perhaps twice as many females.

For various reasons arising from the experimental conditions, it is not believed that the changes in density observed can be regarded as normal, but a marked drop in numbers from 1935 to 1936 appears to have been of wide occurrence outside the experimental area. *C. H. N. Jackson.*

VANDERPLANK, F. L. **Activity of *Glossina pallidipes* and the Lunar Cycle (Diptera).** *Proc. Roy. Entom. Soc. of London.* Ser. A. 1941–42, v. 16–17, 61–4, 1 graph.

JACKSON, C. H. N. & VANDERPLANK, F. L. **Diameters of Mammalian Erythrocytes.** *Proc. Zool. Soc. of London.* Ser. A. 1942, Sept., Pts. I & II, 57–60.

"(1). We have measured the corpuscles in dried blood films of over 200 individual mammals, mostly wild East African forms, belonging to about 40 species.

"(2). There is not a great deal of variation within the species, but specific measurements vary from about 3 to 9 microns.

"(3). Our results agree fairly well with those of Lloyd and Johnson.

"(4). Closely related species, unless we consider the impala as a gazelle, have corpuscles of about the same size." [This work was done in relation to an investigation of the species of animals on which the tsetse flies feed.—EDITOR.]

GRANT, J., ANDERSON, M. & THOMPSON, R. B. **Case of African Sleeping Sickness.** *Lancet.* 1944, Nov. 11, 624–5, 4 figs.

This is an account of a case of trypanosomiasis which was contracted in Nigeria about September, 1941, and was not correctly diagnosed until March 1944. The patient, an English soldier aged 25, was admitted to a hospital in Nigeria on September 16th, 1941 (soon after his arrival in the country) suffering from enteritis; a week later he had a "blind boil" on the right ear. After another week he had fever and enlargement of the cervical glands. He was treated with emetine, acetarsol and sulphapyridine without benefit. On November 17th, 1941, a gland was removed and reported to be tuberculous; another biopsy of a gland was made on December 11th, 1941, in another Nigerian hospital. He left Nigeria for England on January 6th, 1942, and was boarded out of the army in March, 1942. He then resumed his work as a clerk until December 15th, 1943, with three absences from duty totalling 26 days; two of these were due to transient fever, diagnosed as malarial relapses, and one, in September 1942, was due to axillary adenitis, another gland biopsy being then made and "inflammatory changes of an unusual character" being reported. In 1943 he was very listless, slow to understand what was said and to recognize people; his gait was peculiar and he found it difficult to ascend stairs. His speech became slurred and, finally, a mumble. The cervical glands on the left side swelled in September 1943, his mental torpor progressed, and he was admitted to hospital at Gateshead, Durham, on February 26th, 1944, as a case of encephalitis.

On admission he was apathetic and drowsy and dribbled saliva ; the organic reflexes were normal. The left cervical, the axillary and inguinal glands were enlarged, and the skin of the left cheek and jaw was puffy and showed several patches of erythema. His temperature was normal, pulse rate 112, blood pressure 125/100. The c.s.f. was clear, under increased pressure, and showed excess of lymphocytes[figures for cells and protein not given]. Next day an attack of streptococcal follicular tonsillitis began ; Paul Bunnell test, W.R., and blood cultures gave negative results. By February 29th, the tonsillitis was cured but a sharp attack of facial erysipelas began which was treated with streptococcal antitoxin and sulphadiazine. By March 2nd, his temperature was normal but his pulse rate remained rapid (124) and he showed no mental change. On March 7th the existence of a tropical disease was thought possible owing to his history ; a blood examination showed : Hb 50 per cent. (Sahli) ; erythrocytes 3 millions ; leucocytes 6,000 ; the sternal marrow count was normal but two trypanosomes were found in the marrow film. The c.s.f. and citrated blood were centrifugalized and films made ; no trypanosomes were found in the blood film but they were numerous in that of the c.s.f. The formol-gel test was positive.

On March 11th he was given 1 gm. of tryparsamide and in three days he began to smile and to speak spontaneously ; on March 15th 2 gm. were given and then 3 gm. weekly up to 30 gm. On March 18th the facial erysipelas relapsed and his mental condition deteriorated and he had incontinence of urine ; but the erysipelas was soon cured and his mental condition gradually improved. On March 27th he spoke freely, though with some slurring ; the c.s.f. showed 98 cells and no trypanosomes and on May 5th it was normal except for a slight increase of protein [figures not given]. He was transferred to Liverpool to the care of Dr. A. R. D. ADAMS, who found the c.s.f. cell count to be 10–12 ; protein 0·04 per cent. globulin slightly increased, and glucose normal. In July he returned to work and in September he was still well. [This case illustrates the difficulty of diagnosis in some cases of Gambian sleeping sickness, a matter of special importance at the present time when many soldiers and others are returning from tropical Africa.] *J. F. Corson.*

HARDING, R. D. & HAWKING, F. **Diagnosis of Sleeping Sickness.** [Correspondence.] *Lancet.* 1944, Dec. 23, 835.

Referring to the paper by GRANT, ANDERSON and THOMPSON [above] the authors draw attention to two methods of diagnosis of trypanosomiasis which are more effective than blood examination. The first is gland puncture [well known to medical officers in tropical Africa and introduced by GREIG and GRAY in 1904, see *Sleeping Sickness Bulletin*, 1908, v. 1, No. 2, 54]. Harding found that when both methods were used in infected cases the results were as follows : both positive, 30–40 per cent. ; gland puncture positive, blood film negative, 50–60 per cent. ; blood film positive, gland puncture negative, 10 per cent.

The second procedure is culture of the trypanosomes by the method BRUTSAERT and HENRARD [this *Bulletin*, 1938, v. 35, 704] which HAWKING [*ibid.*, v. 37, 1940, 697] found to be simple and practical. Weinman's method [*ibid.*, 1944, v. 41, 653] is also mentioned but Hawking found it less satisfactory than the other as microscopical examination was more difficult. The procedure is as follows : 5 cc. of the patient's blood is prevented from clotting by mixing with 1 cc. of a 1 per cent. solution of "Liquoide Roche" (sodium polyethanol sulphonate) or of a 0·025 per cent. solution of heparin. About 0·2–0·5 cc. of the mixture is added to 2 cc. of human or guineapig blood, containing 1 per cent. of sodium citrate, in each of 10 tubes. The anticoagulants may be omitted if the infected blood is added quickly before it has time to clot. The tubes

are capped and incubated at 24–30°C. Sterile precautions must be taken. The contents of the tubes are examined microscopically after 10 and 20 days by taking a small sample both from the surface and from the depths of the layer of red cells. The trypanosomes are actively motile but are very unevenly distributed and a prolonged search may be necessary. *J. F. Corson.*

BROWAEYS, J. Inoculation d'un ou de plusieurs trypanosomes à la souris. [**Inoculation of One or of Several Trypanosomes into Mice.**] *Bull. Soc. Path. Exot.* 1943, May 12 & June 9, v. 36, Nos. 5–6, 147–50, 1 fig.

The author studied the infections produced in mice by the injection of different numbers of trypanosomes, varying from a single trypanosome to six or more. He used a strain of *T. brucei* of the Institut Pasteur, Paris, which was of moderate virulence, killing mice in about 9 days. The injections were made subcutaneously. The results are shown in a chart. The incubation period usually diminished as the number of trypanosomes injected was increased, but the duration of the disease appeared to be unrelated to the dose of trypanosomes; a mouse which received four trypanosomes had a chronic infection lasting 30 days, while two mice, each infected with a single trypanosome, died in four days after incubation periods of 9 and 10 days respectively. Except in one doubtful case, all mice receiving more than two trypanosomes became infected; with one or two trypanosomes, however, the results were sometimes negative, but on reinjection with 3, 4 or 5 trypanosomes, the mice became infected. Reference is made to earlier work by v. PROWAZEK [this *Bulletin*, 1913, v. 2, 39] OEHLER [*ibid.*, 1913, v. 1, 525; v. 2, 359], HENNINGFELD [*ibid.*, 1914, v. 3, 429] and TOPACIO [*ibid.*, 1934, v. 31, 215]. *J. F. Corson.*

POURSINES, Y., PIGOURY, L., BORDE, R. & BERNARD, M. Trypanosomose expérimentale du cheval à *Trypanosoma evansi* (souche syrienne). I. Etude clinique. [*T. evansi* **Infection of the Horse. I. Clinical Study.**] *Bull. Soc. Path. Exot.* 1943, July 7, v. 36, Nos. 7–8, 235–44, 4 figs. on 2 pls.

POURSINES, Y. & PIGOURY, L. Trypanosomose expérimentale du cheval à *Trypanosoma evansi* (souche syrienne). II. Études sérologique et hématologique. [*T. evansi* **Infection of the Horse. II. Serological and Haematological Studies.**] *Bull. Soc. Path. Exot.* 1943, July 7, v. 36, Nos. 7–8, 244–56, 4 figs. on 2 pls.

LWOFF, Marguerite & NICOLLE, P. Recherches sur la nutrition des réduvidés hémophages. II. Besoins alimentaires des adultes de *Triatoma infestans* Klug dans les conditions habituelles d'élévage. Fécondité des femelles. [**Food Requirements of** *T. infestans*: **Fertility of Females.**] *Bull. Soc. Path. Exot.* 1943, Mar. 10 & Apr. 14, v. 36, Nos. 3–4, 110–24, 2 figs.

NICOLLE, P. & LWOFF, Marguerite. Recherches sur la nutrition des réduvidés hémophages. III. Alimentation artificielle de *Triatoma infestans* Klug au moyen de sang défribriné hémolysé. [**Artificial Feeding of** *T. infestans* **with Defibrinated Haemolysed Blood.**] *Bull. Soc. Path. Exot.* 1943, May 12 & June 9, v. 36, Nos. 5–6, 154–67, 8 figs.

LEISHMANIASIS.

KIRK, R. **Studies in Leishmaniasis in the Anglo-Egyptian Sudan. VI.—The Evolution of Leishmania Infections in Man.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1944, Aug., v. 38, No. 1, 61–70. [24 refs.]

In discussing the evolution of leishmania infections in man the author notes that three main types of disease occur, *viz.*, oriental sore, kala azar and American mucocutaneous leishmaniasis. Actually there is no hard-and-fast line of demarcation between these three types. Thus, typically, oriental sore is a purely cutaneous infection at single or multiple foci, the termination of which is followed by complete immunity, but it is becoming evident that in kala azar there is a primary skin lesion which, instead of healing and leaving a solid immunity, leads to a generalized infection and the disease kala azar. Again, in the American mucocutaneous disease a primary purely cutaneous infection occurs and often behaves as oriental sore, healing and establishing an immunity. In some cases, however, following the healing of the primary sore after a varying interval the lesions in the mucosae of the nose, mouth or pharynx appear. The author points out that though he has seen no record of any generalized infection following the healing of the primary sore it is inconceivable that such does not occur in those cases in which the mucosal lesions subsequently develop. This development of the mucosal infection in the American disease is analogous to the cutaneous eruptions known as dermal leishmanoid which in India and the Sudan follow recovery from kala azar.

While the three disease types mentioned above may be clearly defined, it appears that transition forms not infrequently occur. In oriental sore, for instance, there is evidence that sometimes infection is not limited to the skin, while symptoms suggesting a generalized infection have been noted. In kala azar leishmania have been found in the nasal mucosa and tonsil. The author has noted the appearance of lesions in the mucosae of the nose and mouth simultaneously with the development of the post-kala-azar cutaneous eruption, while in India observers have described a similar ulceration of the lips, palate and tongue. In the Sudan the author has come across a number of cases in which the three main types merge into or follow one another so that there may be a difficulty in deciding whether a case is one of oriental sore or of a primary lesion of kala azar, or again, whether a case is one of mucocutaneous leishmaniasis or whether the mucosal lesions are the expression of a post-kala-azar condition. It is only by observations over long periods that a final decision can be made in such cases.

In discussing the reasons for the variations the author suggests that most are due to the existence of different strains of leishmania of varying virulence and tendencies. The marked difference between strains of leishmania causing oriental sore and kala azar are well recognized, but minor differences occur within these groups. The leishmania of Indian, Sudan, Mediterranean and Chinese kala azar are not identical in all respects and similar variations occur between the leishmania of oriental sore in different localities. Even in adjacent areas the same disease may show that the causative organisms are not quite alike and are undergoing evolutionary changes. Thus post-kala-azar dermal leishmaniasis is a common sequel of the disease in Bengal, but it is rarely seen in Assam, where the disease is of epidemic character. Recently, Russian workers have claimed that the two types of oriental sore occur in Turkestan [see this *Bulletin*, 1944, v. 41, 332]. There is evidently much to be said for the author's point of view, which he has carefully and logically expounded in this very interesting paper. *C. M. Wenyon.*

PIFANO, C. F. Notas sobre entomologia médica venezolana. I. Flebotomos transmisores de leishmaniasis tegumentaria en el valle del Yaracuy. [**Notes on Medical Entomology in Venezuela. I.** *Phlebotomus* **as Vectors of Dermal Leishmaniasis in the Yaracuy Valley.**] *Bol. Ent. Venezolana.* Caracas. 1943, v. 2, No. 2, 99–102. English summary. [Summary taken from *Rev. Applied Entom.* Ser. B. 1944, Nov., v. 32, Pt. 11, 216.]

Investigations on dermal and mucocutaneous leishmaniasis attributed to *Leishmania brasiliensis* were made during the years 1936–40 in a part of the State of Yaracuy, Venezuela, where the infection occurs frequently in man under various forms in the rural areas, and is also found in dogs. The endemic zone is very damp during the rainy season, when it is subject to floods, and the vegetation is luxuriant. Adults of *Phlebotomus longipalpis*, Lutz & Neiva, *P. migonei*, França, *P. intermedius*, Lutz & Neiva, and *P. davisi*, Root, were taken in dwellings feeding on persons with leishmania lesions, and *P. migonei* was also taken on dog. *P. maracayensis*, N. Tov., was found in a fowl house. Descriptions are given of flagellates found in *P. migonei*, *P. longipalpis* and *P. davisi*, and morphologically identical with the culture forms of *L. brasiliensis* from mucocutaneous lesions.

GUPTA, J. C. & KAHALI, B. S. **General Pharmacology of** *Umbellatine*, **a New Alkaloid isolated from** *Berberis umbellata* **Wall. and** *Berberis insignis* **Hook F. and its Use in the Treatment of Oriental Sore.** *Indian J. Med. Res.* 1944, May, v. 32, No. 1, 53–6. [12 refs.]

In a pharmacological study of umbellatine, an alkaloid ($C_{22}H_{25}O_8N$) isolated from *Berberis umbellata* and *B. insignis*, it was found to be similar to berberine but more intense in its action except in the cardio-vascular responses, which were feebler than those produced by berberine. As berberine acid sulphate in 2 per cent. solution (orisol) has been employed with some success for the infiltration treatment of oriental sore, the authors tested the new alkaloid in 0·5 per cent. solution in the treatment of a number of cases. Small uninfected sores were cured by one or two injections, but sores with secondary infections required from 10 to 12 weekly injections. In one case with two infected sores, one was treated with the new alkaloid and the other with orisol. The two sores healed simultaneously. The authors consider the results obtained to be encouraging. It is claimed that umbellatine in a strength of 1 : 50,000 inhibits the growth of *Leishmania tropica* in a liquid haemoglobin saline medium, whereas at five times the strength it has no action on *L. donovani*.

C. M. Wenyon.

FEVERS OF THE TYPHUS GROUP.

GROMASHEVSKY, L. V. & STEPANOV, I. R. [**Observations on the Epidemiology of Exanthematic Typhus.**] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii.* Moscow. 1944, No. 3, 52–6. [In Russian.]

Of 486 outbreaks of typhus, 40 per cent., occurring in rural districts, consisted of single cases only. These single cases did not differ in clinical picture or any other respect from those which led to multiple outbreaks. The latter soon died out in all cases, in spite of the fact that hospitalization was delayed on an average to the 5th–8th day of the disease, and in some cases as late as the 12th day. The early suppression of the disease in spite of the delay in hospitalization

was attributed to the low incidence of lousiness in the population ; five cases were actually not admitted to hospital, yet did not give rise to any secondary cases. The authors nevertheless consider that a further reduction in the incidence of the disease could be obtained if earlier hospitalization and more vigorous countermeasures were practised. *D. J. Bauer.*

COHEN, S. S. & CHARGAFF, E. **Studies on the Composition of** *Rickettsia prowazeki.* *J. Biol. Chem.* 1944, Aug., v. 154, No. 3, 691–704, 3 figs. [16 refs.]

The studies described in this paper were of a highly technical kind ; they were carried out at the request of Colonel H. PLOTZ, who supplied the necessary formolized yolk-sac cultures of *Rickettsia prowazeki.*

By various procedures involving the use of the ultracentrifuge and electrophoresis it was possible to isolate specific antigenic substances and to determine some of their chemical, immunological, and protective, properties. They were found to consist of high-molecular carbohydrate-protein complexes ; nucleic acid and lipid fractions were also isolated.

The original paper must be consulted by those who are interested in this kind of investigation, which can be carried out only by highly specialized workers who have the necessary laboratory equipment at their disposal.

John W. D. Megaw.

ANDERSON, C. R. **Experimental Typhus Infection in the Eastern Cotton Rat** (*Sigmodon hispidus hispidus*). *J. Exper. Med.* 1944, Nov. 1, v. 80, No. 5, 341–56. [11 refs.]

This paper is rich in technical information which will be highly valued by those who are working on the fundamental problems of the fevers of the typhus group. Of general interest is the discovery that cotton rats are highly susceptible to classical and murine strains of typhus rickettsiae. By using large doses of the infecting material it was found possible to produce fatal infections by both types of the organisms.

So far as the author knows there is only one other animal—the South-African gerbil—which shares this degree of susceptibility to the two infections.

Transmission of uniformly fatal infections through an unlimited number of passages was achieved by the intracardial or intracerebral injection of large doses of suspensions made from the livers of infected cotton rats. An important point was the removal of the livers at the time of maximum infectivity. Larger doses were needed in the case of murine than of epidemic infection. Although the lethal dose was large the immunizing dose was relatively small ; the lethal dose was about 10,000 to 100,000 times larger than the immunizing.

Rickettsiae were easily demonstrated in smears made from the liver or brain, also from exudates into the peritoneum and pericardium.

A partial degree of cross immunity was demonstrated between the murine and epidemic types of infection. Sera of the infected animals did not agglutinate *Proteus OX19.* Very little trouble was experienced from secondary infections among the animals. Three strains of classical rickettsiae and two of murine were tested and though these came from widely separated parts of the world all of them were capable of causing uniformly lethal infection in the animals.

The author thinks it possible that a strain of rickettsia may be found which will be neutralized in high titre by sera of both epidemic and murine origin. Some of the strains already investigated " appear to cross more than others when used as antigen in the neutralization test."

It is mentioned that the data obtained by the U.S.A. Typhus Commission show that the complement-fixation test is an accurate means of diagnosis.

[From the context it appears that this statement applies to the differential diagnosis of classical from murine typhus.] *John W. D. Megaw.*

RUIZ CASTAÑEDA, M. & ROBERTO SILVO, G. **Preservation of Classic *Rickettsia prowazeki* in the Lungs of Mice after 74 Consecutive Transfers.** *J. Infect. Dis.* 1944, Sept.–Oct., v. 75, No. 2, 103–5.

The special point in the technique adopted by the authors was the addition of sterile sulphathiazole to the suspensions of mouse lung used in making the transfers of infection from lung to lung. By this means secondary infections were kept in check, and it was found possible to make 74 successive transfers of two strains of *Rickettsia prowazeki* through the lungs of mice by intranasal inoculation.

The original inoculum consisted of tissue cultures of fragments of tunica vaginalis which were removed from infected guineapigs on the 8th or 9th day after inoculation. After one or two lung transfers virulent pulmonary infection was established, and the addition of sulphathiazole to the lung suspensions used in making the transfers prevented complicating infections by Gram-positive cocci.

In spite of this precaution two kinds of secondary infection sometimes occurred. One of these was a bacteria-free pneumonia caused by virus infection ; this was frequent, and in some of the affected mice it was observed that the usual bacilliform rickettsiae were replaced by considerable numbers of very small cocci whose nature has not yet been investigated. The other secondary infection was by Gram-negative organisms whose presence did not prevent the development of the rickettsiae, but when the organisms were inoculated intraperitoneally into guineapigs they caused a fatal infection accompanied by scrotal swelling. Rickettsial strains obtained from tunica washings of guineapigs infected with these organisms did not cause orchitic lesions, but did cause typical classical infection.

The maintenance of the classical strains of rickettsiae for an indefinite number of passages were found to be of great help in the routine preparation of the bivalent vaccine employed by the senior author. *John W. D. Megaw.*

LEON, A. P. El concepto unicista de la etiologia del tifo exantematico y la clasificación de la *Rickettsia prowazeki*. [**The Unitary View of the Aetiology of Typhus Exanthematicus, and the Classification of** *Rickettsia prowazeki*.] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1944, June, v. 5, No. 2, 137–52, 1 folding fig. [30 refs.] English summary.

The author produces further evidence to show that there is no uniform association, either between murine or endemic typhus and orchitic strains of rickettsiae or between human or epidemic typhus and non-orchitic strains. He prefers the name " vaginalitic " as a designation for strains in which pronounced scrotal reactions occur regularly in successive passages through guineapigs, and " non-vaginalitic " for strains which cause either no such reaction or one that is late and transitory. The disease in man is regarded as epidemic when the evidence points to transmission from man to man, and as sporadic when there is no evidence of such transmission.

Among 36 cases investigated by the author, 29 strains were isolated, of which three were definitely vaginalitic and one was doubtfully so. One case was of special interest ; a married couple were attacked by typhus fever three days after arrival from a place where the disease was prevalent in epidemic form ; 16 days later one of their children was attacked and within the next six days 7 others were attacked. Twenty days after the onset of the last of these cases a

woman who had washed the clothes of the family was attacked, and from her blood a definitely vaginalitic strain was isolated. The family and their clothing were heavily infested with lice, and obviously the infection had been transmitted at least three times through the cycle man-louse-man. In another case of vaginalitic infection the evidence of louse transmission was equally clear.

Of the patients from whom non-vaginalitic strains were isolated 19 were louse-infested and were attacked during an epidemic ; only one was a sporadic case in a louse-free person.

Great variations were found in the virulence of four non-vaginalitic strains as judged by their lethality to rabbits ; one killed 61·4 per cent. of the rabbits that were inoculated, another killed only 12·5 per cent. The only vaginalitic strain studied in this way killed 18·3 per cent. of the inoculated rabbits, and the original Mooser vaginalitic strain did not kill any of 15 rabbits inoculated with tunica-vaginalis material.

The author quotes the observation of ZWIERZ [this *Bulletin*, 1938, v. 35, 786] who isolated a strain from rats and passaged it 13 times through guineapigs, none of which showed an orchitic reaction. The conclusion reached is that typhus exanthematicus is caused by a single species of rickettsia of which there are two strains, *R. prowazeki prowazeki* and *R. prowazeki mooseri* ; the former is non-vaginalitic and the latter vaginalitic. Either strain can cause endemic or epidemic typhus and either can be of high or low virulence, according to the conditions in which transmission occurs.

[It is becoming clear that if there are two species of rickettsiae, one of which causes flea-borne typhus and the other louse-borne typhus, they cannot be differentiated with certainty by the presence or absence of orchitic properties, but it does not follow that there are no specific antigenetic differences between them. Recent work on complement-fixation and rickettsia-agglutination reactions suggests the possibility that such differences may exist, though much more work will be needed before a final verdict can be given on this question.

Taking the broad view it is usually easy to decide whether transmission is from man to man by lice or from rat to man by fleas, but in conditions in which both of these modes of transmission are epidemiologically possible physicians and public-health workers cannot yet rely on the results of animal experiments as safe guides to the measures of prevention that are needed. In such cases the only safe rule is to control both lice and rats.] *John W. D. Megaw.*

VAN ROOYEN, C. E., with the technical assistance of D. DARSKIN, G. R. POLLACK & W. G. C. BEARCROFT. **Typhus Rickettsial Agglutination Tests in the M.E.F. and Egypt.** *J. Egyptian Pub. Health Ass.* 1944, June, v. 19, No. 6, 23–98, 3 charts.

The author has already described the results of rickettsia-agglutination tests carried out in 50 cases of typhus-group fevers in the Middle East [this *Bulletin*, 1943, v. 40, 895]. The continuation and expansion of the previous investigation are dealt with in the present paper, and the former conclusions are regarded as having been confirmed. In 323 cases the agglutination titres of " epidemic " and murine strains of rickettsiae have been tested (these reactions will be referred to as E.R. and M.R.) : in many cases the Weil-Felix test was also carried out, *Proteus OX19*, *Pr. OX2*, and *Pr. OXK* were employed (these reactions will be called *OX19*, *OX2* and *OXK* respectively).

A study of the typhus fever prevailing among Egyptians showed that the disease was of the epidemic type, though from the data supplied in the paper a few of the cases seem to have given ambiguous responses ; for example, in one case tested on the 7th day, the E.R. and M.R. titres were each 200, and guineapig inoculation gave a negative result.

In Palestine the disease is known to be chiefly murine in type ; the official reports show that in 1942 there were 275 cases with only 2 deaths, and that the chief season of prevalence was in the months August to November. Correspondingly, the reactions of military patients stationed in Palestine were of the M.R. type in the great majority of cases.

Sera from 81 civilian patients in Iraq and Iran were tested in the months of February, March and April 1943 : the reactions of 75 were of the E.R. type, and only 6 M.R. reactions were observed. These results were in agreement with those observed in military patients from the area.

Clinical and laboratory details are given of each of the 50 cases whose reactions were reported in the previous paper, but information regarding the epidemiological conditions is seldom sufficient to justify an opinion as to which vector was concerned in transmission in a particular case. When the E.R. was positive at a higher titre than the M.R. the case was regarded as being of the epidemic louse-borne type, and when the M.R. titre was higher the diagnosis was murine typhus. [It should be pointed out that in 9 of the cases diagnosed as murine the M.R. titre, ranging from 300–2,000 was only twice, or less than twice, as high as the E.R. titre which ranged from 200–1,600 ; and in 4 of the cases diagnosed as epidemic the E.R. titre ranged from 800–2,000 and the M.R. titre was half as high in each case. In the later tests there were fewer cases in which the difference between the titres was so small, but the occurrence among 323 patients of nearly 40 cases in which the titre was only twice as high for one strain as for the other suggests that the test cannot always be relied on for the differentiating between the two strains.]

The author discusses the occurrence of cases in which the *OX2* titre was exceptionally high ; the following examples are of interest in this regard :—

Locality of occurrence	*OX19*	*OX2*	*OXK*	E.R.	M.R.	Diagnosis
Sarafand	400	5,000	400	200	300	Murine typhus
Gaza	100	3,200	200	0	50	Do.
Cairo	200	1,600	400	0	0	*OX2* type

The case from Sarafand is said to have been " vaguely suggestive of tick typhus," but later it is stated that " there has been no evidence to hint that our cases were associated with the bites of ticks." [The Sarafand patient is said to have crushed ticks from his dog, and the clinical description seems to be more in keeping with the diagnosis of tick typhus than of flea typhus. These and some other cases suggest that the possible occurrence of tick typhus in the area ought to be considered. It would be surprising if the tick-borne disease were absent from the area.]

Many guineapig inoculations were carried out, and 28 epidemic strains were isolated from patients and their lice. Attempts were made to isolate strains from " six cases of clinically typical mild murine typhus in Egypt," but only one guineapig reacted and "even in this the strain died out on secondary passage."

Positive M.R. reactions (1–40 to 1–800) were observed in more than half of 38 wild rats, *Rattus norvegicus*, trapped at three desert camps where 24 cases of mild murine typhus had occurred ; all the rats gave negative responses with the E.R. test. The number of positive reactions among other groups of rats is shown in the table below. Reactions of 1–100 and over were counted as positive.

It is claimed that " R.A. tests should prove invaluable in elucidating the precise nature of all suspected cases of typhus fever " and that it would " contribute towards the better description of typhus fever if the terms epidemic and endemic were discarded and instead the disease were labelled

Place of Origin	Number of rats	*OX19*	M.R.	E.R.
Laboratory white rats	56	18	0	0
Palestine (various localities)	514	44	86	13
Port Said Docks	74	3	24	0
Cairo	120	9	1	0

according to the insect vector responsible, *e.g.*, louse, flea, tick and mite-borne typhus. The introduction of the R.A. test brings such a classification within the bounds of reality."

[The comments made on the previous paper written by the same author hold good for the present article. He has produced important evidence in favour of the hypothesis that louse-borne and flea-borne typhus can be differentiated by serological tests, but the reviewer is reluctantly compelled to regard the argument as being not yet proved.] *John W. D. Megaw.*

SMORODINTSEV, A. A. & DROBYSHEVSKAYA, A. I. **Early Diagnosis of Typhus Fever through Detection of a Specific Antigen in the Blood.** *Amer. Rev. Soviet. Med.* 1944, Feb., v. 1, No. 3, 229–32.

SMORODINTSEV and FRADKINA have already described a rapid slide-agglutination reaction for detecting the presence of a specific antigen in typhus fever at an early stage of the illness while antibody formation has not yet progressed so far as to neutralize the antigen. [See this *Bulletin*, 1944, v. 41, 1021.]

In the present paper the authors describe a complement-fixation reaction by which the same result is said to be obtained.

The reaction is strongest during the first few days of the attack and becomes progressively weaker as the production of antibodies increases, so that by the 10th day it ceases to be positive. Correspondingly the Weil-Felix reaction, which depends on the presence of antibodies, is negative at first and becomes progressively stronger.

Results obtained by the test, and by the Weil-Felix reaction in the same patients, are shown in the table. The figures in brackets show the number of cases in which the reaction was positive for the particular test and negative for the other.

Days of the fever	Number of patients tested	Positive Complement fixation	Positive Weil-Felix
1–2	13	13	0
3–4	18	11	0
5–6	76	44 (31)	29 (16)
7–8	75	33 (17)	45 (29)
9–10	32	12 (2)	21 (11)
Over 10	36	0	35

The controls consisted of 57 patients suffering from typhoid, dysentery, pneumonia, etc.; all gave negative reactions with both tests. The technical details cannot be summarized. Sera for test were inactivated at 56°C. for 30 minutes, and were used in 1 : 3 dilutions. The antisera were obtained from typhus convalescents after the 7th afebrile day: these were inactivated in the same way, and were diluted 1 : 10. In each test 0·2 cc. of diluted patient's serum and of antiserum were mixed in each of four tubes, to which were added

varying quantities of titrated complement. The tubes were kept at 0·2°C. for 18 hours. Sensitized erythrocytes were added and the tubes were kept at 37°C. Readings were made as soon as haemolysis occurred in the three sets of control tubes which were used in each batch of tests.

The authors expect that the sensitiveness of the reaction will be increased by using anti-rickettsial serum obtained from hyperimmunized rabbits instead of human convalescent serum as the antiserum. *John W. D. Megaw.*

FROMME, W. & GAASE, A. Zur Spezifität der Proteus *OX*19-Agglutination nach Weil-Felix. [**The Specificity of the Weil-Felix Reaction for** *Proteus OX19*] *Münch. med. Woch.* 1943, July 16, v. 90, No. 28/29, 415–16.

Careful Weil-Felix tests were carried out in 8,600 presumably healthy persons whose sera were being tested to exclude syphilis. Readings were made after the tubes had been kept two hours in the incubator, and again after a further period of about 20 hours at room temperature. It was found that more than one-quarter of the cases with end-titres of 1–100 or over would have been returned as negative if the first reading only had been made. In a few of these cases the 24-hour titres were quite high.

Among the 8,600 sera 445 gave positive reactions; the titre was 1–100 in about half of the cases and 1–200 in 44 per cent. In two it was 1–3,200. An attempt was made to investigate the association between positive reactions and previous exposure to the risk of typhus infection, and it was found that in 41 per cent. of the reacting persons there had been some contact with typhus conditions or there had been antityphus inoculation. The author concludes that the reaction was likely to have been specific in these persons, so that the percentage of presumably non-specific reactions would be reduced from 5·2 to 3·1, and he believes that even the latter figure is too high because there might have been an unknown association with typhus conditions in many cases in which the persons gave negative histories. In support of this view he mentions the curious fact that the proportion of positive reactions was nearly twice as high in June as in April; this increase in the number of positives is attributed to the occurrence of "inapparent" attacks of the disease during the typhus season. He also found that there was a close degree of correspondence between the types of reaction occurring in the person with, and in those without, a history of association with typhus conditions; in both groups about 50 per cent. of the reactions were at a titre of 1-100. [Titres of 1-400 and higher were, however, three times more numerous among those with a history of contact with typhus conditions than among those with no such history.] The author further argues that if the reactions are not regarded as positive unless the titre is at least 1–200, the non-specific reactions would be reduced to the remarkably low percentage of 1·2. The only clear evidence of non-specific reactions was found in connexion with jaundiced persons; 8 per cent. of these gave positive reactions. The author concludes that the reaction reaches a high standard of specificity as a test for typhus fever. *John W. D. Megaw.*

BRUMPT, L. L'hémoagglutination rapide appliquée au dépistage du typhus exanthématique. [**The Application of a Rapid Blood-Agglutination Test for detecting the Occurrence of Typhus Fever.**] *Bull. Soc. Path. Exot.* 1943, May 12 & June 9, v. 36, Nos. 5–6, 175–87, 1 fig. & 1 pl. (chart & coloured figs.)

The author, with enthusiasm that appears to be justified, describes the practical application of the simple agglutination test devised by himself in 1940.

He calls the test the "haemodiagnostic" or "H.D." test; it has been applied by him in thousands of cases, not only for the detection of typhus fever, but also—with appropriate bacterial suspensions—for brucellosis, fevers of the enteric group, and bacillary dysentery.

In typhus fever he has the impression that the test is even more reliable than the standard Weil-Felix reaction. The technique, in outline, is as follows. A 24-hour agar culture of *Proteus OX19* is mixed with a 10 per cent. solution of citrate of soda to make a milky suspension, which is titrated so as to give a reading of 100 with the Vernes photometer after being diluted 1–20. Commercial formol is added to make a strength of 0·5 per cent. One drop of 1·0 per cent. solution of pure methylene blue is added to each cc. of the suspension. After keeping at room temperature for a few days the suspension is filtered through cotton wool. It keeps well for at least six months, preferably in sealed ampoules kept in the ice box.

A drop of the suspension, after shaking, is placed on a slide; half as large a drop of finger blood is picked up on the corner of a glass slide and stirred into the suspension so as to make a pool of 15 mm. diameter. The pool should then be brownish green in colour, if it is pure green the quantity of blood is not enough. The slide is placed on a white porcelain plate which is rocked with the movement used in "rolling a marble round a plate"; this movement is an essential part of the technique. In negative reactions no change is seen in the specimen, these may occur when the Weil-Felix titre is less than 1-100. When a thin discontinuous narrow blue ring appears within 4 minutes the reaction is considered to be doubtfully positive. A continuous narrow blue ring at the margin of the drop, appearing within two minutes, corresponds roughly to a Weil-Felix titre of 1–200 to 1–800. A thicker blue ring in which fine granules are seen within one minute corresponds to a titre of 1–400, to 1–1,600. A broad deeply stained ring appearing in 30 seconds corresponds to 1–800 to 1–3,200. When large blue granules appear at once and encroach on the central part of the pool a still higher titre is indicated.

The author points out that the Weil-Felix titre is far from having an accurate mathematical significance. Different observers, employing different strains and different techniques will obtain widely varying results with the same sample of serum.

If the H.D. test is carried out on a piece of fresh photographic paper with a smooth gelatin surface, a permanent record of the result can be obtained. The paper is first fixed with "hypo" then washed and dried. When the reaction is complete, and in any case within four minutes, the liquid is pipetted off and the paper is allowed to dry in the air for fifteen minutes or so. It is then washed in water to remove the remaining red blood cells so that only the blue ring is left.

A coloured plate shows the different types of reaction that occur.

The method is now widely used in French North Africa by physicians and medical officers of health. With proper organization as many as a hundred tests can be carried out within an hour. *John W. D. Megaw.*

BISCHOFF, G. Ueber Ergebnisse mit einer Hautprobe bei Fleckfieber. [**The Results obtained by a Skin Test in Typhus Fever.**] *Klin. Woch.* 1943, Mar. 13, v. 22, No. 11, 227–30.

The test consisted in the intracutaneous injection of 0·15 cc. of the weakest strength of Weigl's louse vaccine. Reactions were regarded as positive when a zone of redness of at least 1·0 cm. diameter persisted at the end of two days. A red linear streak or a lentil-sized zone of redness was regarded as negative.

Healthy persons and patients suffering from diseases other than typhus gave positive reactions provided that they had neither suffered from typhus

fever nor been vaccinated with Weigl's vaccine. Typhus patients, as well as healthy persons who had previously been inoculated with Weigl's vaccine, also gave positive reactions.

About three-fourths of the typhus patients who had not been vaccinated gave negative reactions when tested between the 6th day of the fever and the 15th day after the end of the fever. These negative reactions were regarded as indicating the presence of specific neutralizing antibodies.

The positive reactions in typhus patients who had been vaccinated were regarded as being due to anaphylaxis associated with the albuminous substances contained in the louse vaccine. *John W. D. Megaw.*

GIROUD, P. Réactions d'hypersensibilité cutanée à l'antigène tué, test clinique de l'immunité chez les anciens typhiques et les sujets vaccinés. [**Reactions of Cutaneous Hypersensitiveness to Killed Antigen, a Clinical Test of Immunity in Previous Cases of Typhus Fever and in Vaccinated Persons.**] *Bull. Soc. Path. Exot.* 1943, May 12 & June 9, v. 36, Nos. 5–6, 134–45.

The author gives an account of the practical applications of the skin-sensitivity test devised by himself. The antigen used in the research was prepared from the lungs of infected mice or rabbits. Egg-yolk cultures and suspensions made from the intestines of lice were not suitable because they were found to give rise to false positives in some normal persons.

A positive reaction is regarded as clear evidence of a previous attack of typhus fever; it occurs after mild or inapparent as well as after severe attacks. In very debilitated persons the reaction was sometimes negative even after the occurrence of proved attacks.

The author believes that persons who give frankly positive reactions are in a state of "premunition" and therefore need not be vaccinated. When vaccinated persons show slight and incomplete reactions they are regarded as being partially protected; a pronounced reaction indicated immunity.

The author believes that many persons who have been exposed to infection after having been vaccinated suffer from inapparent infection which greatly increases their immunity. Even after attacks of the disease there may be a disappearance of the active immunity, as is shown by the occurrence of negative skin reactions. All persons who fail to show positive reactions need vaccination or revaccination.

Two different strains of antigen were used, one of North-African and one of "Eastern" (de l'Est) origin; both of these gave very similar response when used in testing former cases, whether of North-African or Eastern origin.

John W. D. Megaw.

WOODWARD, T. E., in collaboration with E. F. BLAND. **Clinical Observations in Typhus Fever with special reference to the Cardiovascular System.** *J. Amer. Med. Ass.* 1944, Sept. 30, v. 126, No. 5, 287–93, 3 figs. [Refs. in footnotes.]

The authors describe and discuss the cardio-vascular disturbances observed in 30 patients who were closely studied in a hospital in French Morocco. The investigation formed part of the work of the U.S.A. Typhus Commission.

It was concluded that the abnormalities of the circulatory system were due chiefly to the foci of necrosis in the smaller vessels. The resultant lack of blood-vessel tone, and reduction in circulatory blood volume, were regarded as far more important factors than cardiac insufficiency. Electrocardiograms, made in the most active stages of the illness, sometimes even when the patients were on the point of death, showed no striking evidence of high-grade conduction defects or of important changes in the T-wave; minor abnormalities were

observed in rather less than half of the cases. The venous pressure was consistently low, 2–12 cm. water; it was not increased by intravenous injections of 1,000 cc. of fluid, so that there did not appear to be any important element of cardiac weakness. X-ray photographs, taken in 12 cases, showed no evidence of cardiac enlargement.

When dehydration had been overcome the red cell count was found to be 2,500,000–3,700,000 per cmm, and the volume of cells was reduced to 23–42 volumes per cent. There was a tendency to leucopenia; the usual white cell counts were 4,000–6,000 per cmm.; higher counts, up to 10,000 per cmm., were found in association with pyogenic infections. The total protein content of the blood serum averaged 5·2 gm. per 100 cc.; the albumin element was often very deficient and sometimes was as low as 0·9 gm. per 100 cc. while the globulin element showed a lesser reduction. Blood chlorides were reduced, and associated with this finding there was alkalosis in semiconscious patients.

There was little evidence of renal damage, the urine was often free from albumin, but oliguria was often pronounced in the early stages in spite of a fluid intake of 4,000–5,000 cc. Non-protein nitrogen was high in severely ill patients who had not received supportive treatment; but this azotaemic condition could be corrected by giving chlorides and overcoming dehydration, so that it did not appear to be due to renal damage. Only two of the 30 patients died, and one of the deaths was in the case of a woman aged 73, who was admitted late in the second week of the illness. The treatment was on supportive lines, the points specially emphasized being: (1) careful nursing, with frequent changes in position, (2) A daily fluid intake of at least 4,000 cc.—when possible by the mouth but, if necessary, partly by intravenous injection. (3) A few patients were given transfusions of dried blood plasma with excellent effects. (4) 2–4 gm. doses of ammonium chloride improved the hypochloraemia. (5) An indwelling stomach tube was found useful when the patients could not be induced to swallow enough supporting foods; (6) digitalis and other cardiac stimulants were not indicated in any of the cases, though in congestive heart failure or auricular fibrillation they would be likely to be of value; (7) sulphonamides were given in small doses for purulent infection; no ill effects were observed.

[This paper deserves special attention because of clear evidence produced by the authors that the maintenance of nutrition and the prevention of dehydration are factors of primary importance in the treatment of typhus fever. Several German observers have recently pointed out that circulatory failure in this disease is commonly caused not by cardiac damage but by disturbances of the vasomotor centres due to intoxication and interference with their blood supply, the latter resulting from lesions of the smaller blood vessels.]

John W. D. Megaw.

SCHELLER, H. Krankheitserscheinungen des Nervensystems bei Fleckfieber. [**Signs and Symptoms of Nervous-System Origin in Typhus Fever.**] *Klin. Woch.* 1943, Apr. 3, v. 22, No. 14/15, 289–95. [31 refs.]

In a long and rather discursive paper the author deals with the signs and symptoms of typhus fever which are associated with damage to the nervous system. An attempt is made to correlate each manifestation of the disease with a particular lesion or group of lesions in the central or peripheral nervous structures. The author himself has not undertaken the difficult task of supplying a summary of the article, for reasons that will be obvious to those who read its contents.

The great variability of the nervous disturbances is stressed; this point is emphasized by the lengthy list of those that are discussed.

A few of them are as follows.—Features of the early stages of the illness are headache, signs of meningeal irritation, supersensitiveness to external stimuli,

apathy, tinnitus, partial deafness, and somnolence. In the later stages, from the end of the first week onwards, there may be auditory or visual hallucinations, delirium, loss of orientation to time and place, motor unrest, dual personality, epileptiform convulsions, hemiplegic seizures, stupor, amentia, acute catatonia, confusion, incoherence of speech and thought, insomnia, mutism, tremors, choreiform movements, tetany, difficulty in protruding the tongue, muscular incoordination, and symptoms of pseudobulbar paralysis. These are only some of the conditions described.

The fall in the blood pressure, tachypnoea, Cheyne-Stokes breathing, and even bronchopneumonia and diarrhoea are attributed to lesions of the central nervous system. Ulnar neuritis was observed in 4 per cent. of the cases seen by the author ; other nerves were less frequently involved.

In early convalescence, emotional disturbances, lack of power of concentration, ataxy, and muscular tremors, are not infrequent. In elderly and alcoholic patients Korsakoff's syndrome was sometimes observed. Low blood pressure, attributable to damage to the vaso-motor centres, sometimes persisted for weeks or months after the end of the fever. *John W. D. Megaw.*

YEOMANS, A., SNYDER, J. C., MURRAY, E. S., ZARAFONETIS, C. J. D. & ECKE, R. S. **The Therapeutic Effect of Para-Aminobenzoic Acid in Louse Borne Typhus Fever.** *J. Amer. Med. Ass.* 1944, Oct. 7, v. 126, No. 6, 249–56, 4 charts. [Refs. in footnotes.]

The authors tried para-aminobenzoic acid in the treatment of 20 cases of typhus fever in the Cairo Fever Hospital of which a special ward was placed at the disposal of the U.S.A. Typhus Commission. Although the number of cases was not large, the tests were so carefully controlled that the favourable results constitute strong evidence of the efficacy of the drug. Full details, including temperature charts, are supplied in respect of 10 cases belonging to the 18–45 age group, and of 9 comparable controls consisting of alternate admissions. Altogether, there were 17 patients belonging to the above age group whose treatment was started within the first seven days of the illness, and 44 control patients comparable in all respects except that the drug was not given. Two patients whose treatment started on the 8th and 9th days, and one aged 70, are excluded from the comparison.

The total duration of the febrile period in the 17 test patients averaged 12·5 days, and in the 44 controls 18·5 days. The average severity of the illness was much less in the treated ; 11 of these had very mild attacks as contrasted with only one of the untreated. Only two of the treated had severe attacks, whereas 31 of the controls had either severe (18), very severe (5), or fatal (8), illnesses.

A remarkable feature of the illness among the treated was that in 9 cases there was a secondary rise of temperature varying from a brief subfebrile relapse to one with a moderately high temperature lasting several days. These recurrences of the fever started soon after the end of the course of treatment by the drug ; none of the patients had severe symptoms ; the duration of the secondary fever is included in the above estimate of the average duration of the fever among the treated cases.

The results were distinctly more favourable in the patients whose treatment was started early than in those who came under treatment on the 6th or 7th day. No benefit was observed in the two patients treated from the 8th or 9th days onwards. In the patient aged 70 death was probably hastened by the drug, which was given to him during collapse and was aspirated into his lung, causing acute bronchitis.

A general tendency to leucopenia was observed among the treated; in two cases the count fell below 3,000 per cmm. and the treatment was suspended.

The initial dose was 4–8 grammes; thereafter 2·0 gm. were given every two hours till the temperature became normal, but the dosage was controlled by frequent estimations of the blood level of the drug; the method adopted was one used for determining the sulphanilamide content of the blood.

The para-aminobenzoic acid was given in powder form, suspended in a quantity of 5 per cent. solution of bicarbonate of soda sufficient to keep the urine approximately neutral and to prevent vomiting caused by the acidity of the drug.

The urinary output was maintained at 1,500–3,000 cc. in 24 hours to prevent high concentration of the drug in the blood, and the toxic symptoms that resulted from this. The optimum dosage of the drug is not yet known. The mode of action was thought to be by inhibiting the multiplication of the rickettsiae and so allowing the natural defences of the body to be mobilized before serious damage could result. The occurrence of the secondary rise of temperature after omission of the drug was thought to favour this view.

The paper contains a table showing the chief data connected with all the treated cases.

The trial of the drug was suggested by the favourable results obtained by SNYDER, MAIER, and ANDERSON (1942) in the treatment of the disease in white mice.

Other reports, including the work of ANDREWES, KING, and VAN DEN ENDE [this *Bulletin*, 1945, v. 42, 20] were received while the work was in progress.

John W. D. Megaw.

LEÓN, A. P. Suero anti-tifo de conejos convalecientes en el tratamiento del tifo exantematico. [**Antityphus Serum from Convalescent Rabbits in the Treatment of Exanthematic Typhus.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1944, June, v. 5, No. 2, 117–28. [17 refs.] English summary.

There were three deaths among 22 patients who were treated for typhus fever by the serum of hyperimmunized rabbits. The ages of the patients are not stated and the author admits that the number treated was too small to justify dogmatic conclusions, but he believes that the serum was of decided value. One of the deaths was attributed to a *Salmonella* infection; in the other fatal cases the treatment was started on the 8th or 9th days. The average duration of the fever was 11·1 days. The serum was prepared from rabbits which had received 5–10 intravenous injections of live classical and murine rickettsiae grown in yolk-sac cultures. The blood was collected 10–20 days after the last injection. Great variations were found in the antigenic properties of the different strains as judged by the titre of the Weil-Felix responses in the inoculated rabbits. The most active strains were employed in preparing the sera that were used. Tests of the protective value of the sera were made on guinea-pigs; these gave unsatisfactory results, but it was believed that rabbit serum was toxic for guineapigs and that some other animal would be more suitable for use in carrying out the tests.

The treatment was by intravenous injections of doses of 20 cc., given very slowly and repeated 12-hourly till the temperature came to normal or nearly normal. The number of injections needed varied from one to four, but the average duration of the illness after starting the treatment is stated to have been 6·2 days. No explanation is given of the discrepancy between these statements.

John W. D. Megaw.

BUSTAMANTE, M. E. & VARELA, G. Caracteristicas de la fiebre manchada de las montañas rocosas en Sonora y Sinaloa, Mexico. (Estudio de 12 casos de dos cepas.) [**The Characteristic Features of Rocky Mountain Spotted Fever in Sonora and Sinaloa, Mexico.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1944, June, v. 6, No. 2, 129–36. English summary.

Between September 1942 and November 1943, 12 cases with 10 deaths occurred in rural areas of Sinaloa and Sonora. The probable vector was *Rhipicephalus sanguineus*. All the patients had been exposed to risk of bites by these ticks, which infested the numerous dogs of the affected localities. The clinical features were those of virulent types of Rocky Mountain spotted fever. Two strains of rickettsiae were isolated from patients; one of these was found by R. R. PARKER to be identical with the Bitter-Root-Valley strain of Rocky-Mountain spotted-fever rickettsiae, and the other was similar in all essential respects. *John W. D. Megaw.*

LIVESAY, H. R. & POLLARD, M. **Serological Studies of Bullis Fever.** *Amer. J. Trop. Med.* 1944, Sept., v. 24, No. 5, 281–4.

The authors have already described the isolation of a rickettsia-like organism by guineapig inoculation from the blood of patients suffering from a new fever called Bullis fever [see this *Bulletin*, 1944, v. 41, 209]. Using an antigen prepared from the spleens of infected mice the authors have carried out a series of complement-fixation tests on sera obtained from 192 former patients, two months after the end of the outbreak.

Owing to the sudden disappearance of the infection from the experimental animals it was not possible to carry out the titration of the sera to their end points. Of the sera 147 (76·5 per cent.) were positive; 115 of these reacted 4+ at a titre of 1–5, and 32 reacted 2+ at the same titre: 45 were negative. The same sera and 59 others from former patients, 261 in all, gave negative complement-fixation reactions for endemic typhus and negative responses with the Weil-Felix test. One of the sera was positive by serum-neutralization test for Rocky Mountain spotted fever.

Control tests were carried out on 29 healthy persons, 4 cases of endemic typhus, 3 cases of Rocky Mountain spotted fever, 2 cases of American Q fever, and 4 cases of scrub typhus; all were negative for Bullis fever.

Sera of 40 deer (*Odocoileus virginianus* subsp.), shot in the camp area, were tested; 4 were positive for Bullis fever, and 2 for Q fever. Sera of 7 rabbits (*Lepus californicus*) from the same area were examined; 2 of these were positive for Bullis fever, none for Q fever. The reason for the negative results in 23·5 per cent. of the patients is discussed; it may have been the disappearance of the serological sensitiveness of the serum or the inclusion of cases of other diseases mistaken for Bullis fever.

The positive reactions in deer and rabbits from the area suggests that these animals may have become infected at some previous time.

An agent has been isolated from *Amblyomma americanum* from the area; this seemed to bear some similarity to the agent isolated by the authors from a human case of the disease.

The conclusion reached is that "There does appear to be some significant serological relationship between the agent isolated from a human case of Bullis fever and the serums of convalescent cases."

It is to be hoped that there will be opportunities for further study of this interesting tick-borne "zootic" fever which, clinically, resembles fevers of the dengue group rather than those of the typhus group.

John W. D. Megaw.

REUTER, A. Ueber das Wolhynische Fieber (Fünftagefieber). [**Trench Fever (Volhynian, or Five-Day Fever).**] *Münch. med. Woch.* 1943, Feb. 5, v. 90, No. 6, 99–104, 7 charts.

This is a lengthy and somewhat discursive description of trench fever. Apart from the characteristic periodicity of the fever (which was often missing) the chief features of the cases seen by the author were the pains in the joints and shin bones; these were often very severe. Cyanosis of the face, often most easily seen in the lips, occurred in many cases and was a useful diagnostic feature. A rash is said to have been more common than would have been expected from the descriptions of the disease by other observers; it was easily missed because of its appearance only in the earliest stage of the disease; it consisted of red macules distributed all over the trunk and on the limbs.

In one case sudden death occurred soon after an injection of prontosil and in another case there was tachycardia with collapse symptoms within an hour of a similar dose. Naturally the use of the drug was promptly abandoned. Suboccipital puncture with the withdrawal of 4–6 cc. of cerebrospinal fluid sometimes, though not always, gave relief from severe headache. Massage of the painful parts was badly tolerated in most cases. Strophanthin was of value in cases with cyanosis.

Unlike many of the German physicians who have described the disease during the present war, the author regards prolonged convalescence as of frequent occurrence. *John W. D. Megaw.*

BIELER, R. Das Blutbild bei Wolhynischem Fieber. [**The Blood Picture in Trench Fever.**] *Münch. med. Woch.* 1943, July 16, v. 90, No. 28/29, 416–18, 3 charts.

In a series of 25 cases daily leucocyte counts were made. A pronounced leucocytosis occurred in association with the paroxysms of fever in every case; the count often rose to 20,000 or more. There was a return to normal or nearly to normal during the afebrile periods, but the author states that trench fever can be excluded if no leucocytosis is observed in any of seven consecutive daily counts. There was always a relative lymphocytosis; not infrequently up to 60 per cent. relative lymphocytosis persisted during the afebrile, as well as the febrile, periods, throughout the illness. There was seldom any considerable increase in the proportion of the immature neutrophiles. *John W. D. Megaw.*

REUTER, A. & SCHÄFER, W. Feldnephritis und Wolhynisches Fieber. [**War Nephritis and Trench Fever.**] *Münch. med. Woch.* 1943, July 30, v. 90, No. 30/31, 437–40, 7 charts.

During two winters in Russia the authors saw many cases of illness of which the chief features were: oedema and breathlessness, often of short duration; fever; and shin-bone pains. The blood pressure was seldom raised, and often the urine was normal. The cases ranged in severity from the mild "oedema disease" to typical war nephritis. In some cases the fever had the same periodicity as trench fever, a disease in which nephritis often occurs. In war nephritis and trench fever the pains are of the same type, so that the authors could not find any real line of distinction between the two diseases. A number of cases are described in support of this contention, and the paper is illustrated by seven temperature charts, of which four show a 5–7 day periodicity. The authors admit the possibility of the coexistence of the two diseases in some patients, but argue, not altogether convincingly, that they were dealing with variants of the same disease. *John W. D. Megaw.*

YELLOW FEVER.

STÉFANOPOULO, G. J. & DUVOLON, S. Réactivation du virus amaril de culture atténué. [**The Reactivation of Yellow Fever Virus from Attenuated Cultures.**] *Bull. Soc. Path. Exot.* 1943, Mar. 10 & Apr. 14, v. 36, Nos. 3–4, 76–82. [16 refs.]

Yellow fever virus, when maintained in tissue culture for long periods, may show a marked falling off in virulence and also a diminution in its antigenic properties. Thus, strain 17 D, after being cultured for two to three years, in 1938 killed mice only after 15 to 20 days, and only in a maximum dilution of 1 : 10,000. As for its antigenic properties in man, this had also diminished, and 30 days after vaccination only a very low titre of antibodies was developed.

In order to obtain a culture vaccine with better antigenic properties, the authors, in 1939–1940, passaged the virus through the brains of mice, and after six passages the virus killed mice in 7 to 12 days, and occasionally was lethal to guineapigs. On the other hand this reactivated virus did not become pathogenic to *Macacus rhesus*, even after two passages in this monkey, although in each case the inoculation was followed by the development of immunity. Attempts to transmit the infection by means of the bites of *Aëdes aegypti* were negative, but the mosquitoes which fed on the first monkey were found to contain virus which was virulent to mice.,

The reactivated virus was again cultivated successfully in the embryonic tissues of incubated eggs. The virus of the first and second passages in eggs killed mice in 8 to 12 days. A vaccine prepared from this virus was used for the vaccination of 102 human subjects, comprising 80 males and 22 females, and including 5 infants from 10 months to 8 years of age. Post-vaccinal symptoms were very slight ; 15 persons had a slight fever between the 4th and 8th days, but in only 5 cases did the temperature reach 38·5°C. (101·3°F.).

Protection tests were carried out on 26 of these patients after an interval of 3 to 4 weeks. Eleven were strongly positive, 13 positive and 2 negative.

E. Hindle.

DENGUE.

DIASIO, J. S. & RICHARDSON, F. MACD. **Clinical Observations on Dengue Fever. Report of 100 Cases.** *Milit. Surgeon.* 1944, June, v. 94, No. 6, 365–9.

The authors, like many other physicians on their first encounter with dengue, were struck by the great variations that occur in the disease, even within the limits of a single epidemic. They have analysed the symptoms and signs observed in 100 consecutive patients somewhere in the South Pacific area, probably in Australia.

The percentage incidence of some of the chief features was as follows. Headache, 94 ; backache, 89 ; pains in legs or joints, especially the knee joints, 75 ; pain on movement of eyeballs, 74 ; chill at onset, 14; chill, not at onset but within 12 hours, 40 ; insomnia, 53 ; weakness, especially of legs, 29 ; when this was complained of it was usually the first symptom ; indefinite feeling of coryza, 24, always before the onset, and never persisting ; fleeting soreness of the throat with the coryza, 12. The temperature fell to, or nearly to, normal, within 2–3 days in most cases ; at the same time the symptoms subsided and the rash faded ; about two days later, the fever, symptoms, and rash, returned, but the second spell of fever was shorter and less severe than the first. There was itching of the palms and soles after the final fall of the temperature in

20 patients. Scleral injection was seen in 89 cases and was the most characteristic of the early signs; in 57 cases pin-point vesicles were observed on the posterior part of the soft palate; these first appeared within about 12 hours of the onset, soon they became red and with their gradual disappearance, the area of redness reached a pin-head size by the 2nd or 3rd day of the fever; the spots resembled the mucous-membrane rash of rubella. There was no return of these spots during the second spell of fever.

The skin rash was quite different from that usually described: in 79 cases a morbilliform rash was seen on admission; sometimes this took the form of discrete pink spots on the sides of the chest, inner surface of the upper arm, and lumbar region. In severe cases there were erythematous areas on the lower part of the face, on the neck, shoulders, and thorax. The rash faded during the afebrile period, and recurred, though less intensely, with the second rise. In 11 cases the rash was absent during the first spell of fever but appeared during the second.

In 33 patients the face was flushed and swollen at the onset. Adenitis was a prominent feature; the posterior cervical glands were enlarged in 94 cases, the epitrochlear in 90, and the inguinal in 80.

A typical "saddle-back" fever curve occurred in 55 cases; there was a single spell of fever ending by lysis in 2–7 days, in 33; the curves in the remaining 12 cases were irregular in type. The leucocyte count ranged from 3,600 to 10,000 per cmm., in the cases examined on the first day; the average count on admission was 5,450, and on the 5th day it was 3,500. *John W. D. Megaw.*

BACILLARY DYSENTERY.

WIRTS, C. W., Jr. & TALLANT, E. J. **Dysentery in American Troops in the Middle East.** *Amer. J. Digestive Dis.* 1944, Aug., v. 11, No. 8, 252–5.

Between January and August 1943, stools from 1,298 individuals belonging or attached to the American Forces in the Middle East were examined macroscopically and microscopically and were cultured on desoxycholate-citrate agar or on eosin methylene-blue agar. Among 300 normal controls, intestinal parasites (protozoa and worm-ova) were isolated from 1 per cent. of 200 American soldiers (all food-handlers), from 4 per cent. of Sudanese soldiers and from 98 per cent. of native workmen, while bacterial pathogens (Morgan's bacillus is included in this category) were recovered from 1·5 per cent. of the American soldiers and from 4 per cent. of the Sudanese soldiers and native workmen. No pathogens were isolated from 6 lots of flies. Among patients with intestinal symptoms, 116 (12 per cent.) harboured intestinal parasites; *E. histolytica* was recovered from 9 patients, of whom 8 had clinical dysentery; hookworm infection was found in 5 patients. Bacterial pathogens were isolated from 238 patients (23 per cent.); the predominant organism was *Bact. flexneri* (including *Boyd 88* or the *Newcastle* variant), isolated from over 60 per cent. of the positive cases; salmonella organisms (including the paratyphoid bacilli) were recovered from 17·5 per cent., *Bact. shigae* from 3 per cent., and Morgan's bacillus from 9 per cent. The dysentery infections were of moderate severity; 60 per cent. of the patients had blood and mucus in the stools. They responded well to sulphaguanidine; salmonella infections did not. Among 300 patients with negative stools, the final clinical diagnosis was mostly of diseases other than intestinal infections.

The authors deprecate the diagnosis of "Gyppy tummy" as if it were a mysterious intestinal infection of non-specific origin to which most newcomers

to the Middle East fall victim. They quote evidence that this condition—characterized by fever, malaise, abdominal cramps and diarrhoea for 2–3 days—is often due to organisms of the dysentery group. *Robert Cruickshank.*

BOSE, A. N. & GHOSH, J. K. **Studies on Sulphanilyl-Benzamide : Toxicity and Absorption.** *Indian J. Med. Res.* 1944, May, v. 32, No. 1, 61–3. [11 refs.]

Sulphanilylbenzamide was described by BROWNLEE and TONKIN [this *Bulletin*, 1942, v. 39, 35] as having properties which might make it more effective in the treatment of bacillary dysentery than sulphaguanidine. It is very insoluble in water. When emulsions were injected into mice intravenously or intraperitoneally the highest doses employed (1·5–2·0 mgm. per gm.) rarely caused death. When 0·5 mgm. per gm. was given to mice orally, the maximum blood concentration was 25 mgm. " free " drug per 100 cc. and 33 mgm. " total " drug. It is absorbed fairly rapidly from the alimentary canal of mice. [The reviewer (*Lancet*, 1942, Mar. 7, 290; *Bulletin of War Med.*, 1942, v. 3, 41) found that following oral administration the concentration of sulphanilylbenzamide in the faeces was comparatively low.] *F. Hawking.*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

MANSON-BAHR, P. **Amoebic Dysentery. Facts and Fallacies in Radical Treatment.** *Lancet.* 1944, Dec. 2, 718–20. [29 refs.]

The author finds it disturbing that the apparently well-founded views of those with long experience of the treatment of tropical disease are being called in question by medical officers of limited experience of these conditions. He quotes the treatment of amoebiasis as a case in point, and observes that after the unduly optimistic early reports on the employment of emetine in *E. histolytica* infections had been tempered by experience and by the acquisition of further knowledge of the life-cycle of the parasite, it was evident that injections of emetine hydrochloride, however large in amount and however prolonged, exerted no recognizable effect on the chronic infection or on the symptoms caused by it—important basic facts apparently not appreciated by many now treating the disease. Emetine given by injection is presumably distributed in the blood stream, and it does not reach the precystic amoebae which congregate on the mucous surface of the bowel and which can be extirpated only by drugs introduced directly into the alimentary tract. E.B.I. (emetine-bismuth iodide) introduced in 1915, was found to be an effective drug against these forms when given orally, and after the 1914–18 war many pensioners were permanently cured of their infections by it. Some however (about 12 per cent.) were resistant to it and these were chiefly cases which had been subjected previously to a long series of hypodermic emetine injections. Continued intensive E.B.I. treatment is useless in such cases, but most of them are curable by chiniofon (B.P.), a combination of iodine with oxyquinoline-sulphonic acid, first used in amoebiasis by MÜHLENS and MENK in 1921 [this *Bulletin*, 1922, v. 19, 31]. Chiniofon is more effective when given as a rectal retention enema (in 2·5 per cent. solution) than by the mouth ; but the author found in 1925 that about one-quarter of a small series of E.B.I. resistant cases were not cured by chiniofon given simultaneously by mouth and rectally.

In view of this, in 1926 [this *Bulletin*, 1932, v. 29, 581] he elaborated his method of combined treatment with the two most specific anti-amoebic drugs—E.B.I. and chiniofon—described in detail in recent editions of his *Tropical*

Diseases and *Dysenteric Disorders*. The author re-emphasizes the importance of attention to detail and to certain precautions in the administration of the drugs, and he draws attention to some reasons for the occasional apparent failure of the treatment; this may be due to giving the E.B.I. in insoluble coated tablets preventing the liberation of the drug in the small intestine, or to the maladministration of the retention enema of chiniofon so that the latter becomes merely a washout, and is neither retained nor distributed throughout the large intestine. A case of allegedly resistant *E. histolytica* infection of long standing is cited, which yielded to his treatment after protein shock therapy.

After reference to the arsenical preparations, acetarsol and carbarsone, and to "Enterovioform" and "Diodoquin"— to none of which does he attach much virtue—the author deprecates the common practice of giving all these drugs in futile and wearisome succession. He reaffirms that the periodic administration of courses of emetine is injurious and should be discouraged, E.B.I. and chiniofon properly given together offering the best hope of permanent cure. *A. R. D. Adams.*

TAUBENHAUS, L. J. **Amebiasis as Cause of Recurrent Abdominal Pain. Report of Cases.** *U.S. Nav. Med. Bull.* 1944, Sept., v. 43, No. 3, 527–31.

Patients complaining of recurrent abdominal pain, not always associated with diarrhoea, present a problem in diagnosis and treatment. The results of clinical examination may vary from absence of physical signs to tenderness over part of the colon, and the blood findings from a normal count to a leucocytosis of 20,000 per cmm. Some of these patients appear ill, others perfectly well; some are eventually diagnosed as having appendicitis and the appendix is removed, but the patient "invariably returns with a recurrence of his symptoms." Many complaining of fatigue and weakness are apt to be dismissed as neurotics or malingerers. For six months routine proctosigmoidoscopic examination has been carried out at several U.S. Naval dispensaries on all patients complaining of recurrent abdominal pain, except those in whom a definite diagnosis of appendicitis or peptic ulcer could be established. In a very large number a diagnosis of amoebiasis has been made. The practice of routine examination of five stools prior to sigmoidoscopy was abandoned as unsatisfactory as it was found that proctosigmoidoscopy sufficed to establish the diagnosis.

Sigmoidoscopic appearances of the amoebic lesion varied from minute, red, punctate ulcers, which appear as pin-pricks in the mucosa, to the typical, larger, irregular, undermined ulcers with necrotic bases. The majority of lesions are found on the rectal valves or on the anterior rectal wall distal to the lowest valve. Minute punctate lesions may easily be overlooked, and are best seen as the instrument is being inserted; in some patients, however, the rectal mucosa had a granular appearance similar to that of early nonspecific ulcerative colitis. The diagnosis can be established only by finding the actual amoebic lesion containing either the motile or cystic forms of *Entamoeba histolytica*. This is best effected by examining fresh scrapings made from the edges of the ulcers, suspended in normal saline. Cleansing the bowel thoroughly with a tap-water enema is sufficient preparation for proctosigmoidoscopy, and more satisfactory than other types of cleansing enemata. Contrary to popular misconception amoebiasis is not a disease of the tropics and subtropics only. The patients involved came from all parts of the U.S.A. and careful history taking elicited the fact that in most cases symptoms were present before enlistment.

The symptoms varied considerably, but in all cases, except one, there was a history of diarrhoea at some time, and all the patients complained of abdominal pain; in most, it was recurrent, cramp-like and difficult to localize. The only

constant sign was tenderness over some part of the colon and only in those with actual dysentery was there any blood in the stools. There was no correlation between the degree of rectal involvement (as seen through the sigmoidoscope) and the clinical picture. Some with mild symptoms had widespread rectal involvement, whereas one with dysentery had only a few minute punctate ulcers. There did, however, seem to be a relationship between the symptom complex and the finding of motile or cystic forms of *E. histolytica* in the scrapings of the ulcers. In those with more severe diarrhoea motile amoebae were present, whilst in those in whom pain and *not* diarrhoea was the outstanding symptom the cystic form predominated. The question whether " dysentery " or the milder type of infestation results seems to depend on the resistance of the host; thus " amoebiasis " may present a clinical syndrome different from that of " amoebic dysentery."

The author concludes that " probably any adequate specific therapeutic regime will suffice to cure these cases." Treatment usually consisted of a course of emetine injections, followed by successive courses of carbarsone, vioform and yet more carbarsone. *P. Manson-Bahr.*

ATWELL, A. G. & BAILEY, N. **A Case of Amoebic Cystitis.** *South African Med. J.* 1944, Oct. 14, v. 18, No. 19, 335.

The case described came under observation for burning sensation during micturition. Examination of the urine revealed red blood corpuscles, epithelial cells and a few pus cells as well as actively motile *E. histolytica*, some of which contained red blood corpuscles to the number of seven. Amoebae were again observed two days later but many were rounding off and dying, while others were sluggishly motile. The following day further signs of degeneration of the amoebae were noted, while a flagellate was seen. After two more days nothing abnormal could be detected. The patient was sent to hospital, where amoebae could not be detected though *Trichomonas hominis* was found. Investigation showed that the inflammation was confined to the bladder and did not extend to the ureters or kidneys. The urinary condition, shown to be due to *Bact. coli*, cleared up on treatment with sulphonamide. *C. M. Wenyon.*

VERSIANI, V. & RENAULT, L. Incidencia da " *Giardia lamblia* " em Belo Horizonte [**Incidence of** *G. intestinalis* **in Belo Horizonte.**] *Brasil-Medico.* 1944, Aug. 19, & 26, v. 58, Nos. 34 & 35, 322–4.

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

MARQUES, A. **Tick Spirochaetosis or Non-Epidemic Relapsing Fever at Xinavane.** *South African Med. J.* 1944, Nov. 11, v. 18, No. 21, 360–64.

The author reviews the clinical histories of cases of tick fever observed at Xinavane, Lourenço Marques, and calls attention to the extraordinary diversity of symptoms which may simulate the most varied diseases, ranging from malaria, broncho-tracheitis and dysentery to orchi-epididymitis, epilepsy and even obesity. The necessity for blood examination in order to arrive at a correct diagnosis is evident, and the author recommends the use of thick films stained with Leishman's stain. No satisfactory results were obtained by the use of organic arsenicals such as neoarsphenamine, and the author now limits himself mainly to symptomatic treatment.

The normal vector, *Ornithodorus moubata*, is widespread, but it is particularly desirable that all buildings occupied by successive gangs of Africans should

be disinfested. The author recommends plastering the floor and walls with cement, leaving a hollow groove about a yard above the floor level to act as a hiding place for ticks. During the day this groove can be gone over with a blow-lamp or sprayed with an insecticide such as "Destructine No. 2," or "Pyagra" diluted with 9 parts of paraffin.

The author gives figures showing the early records of sickness, etc., on the Incomati Estates. These figures indicate a decline in the general sick-rate after the introduction of plastering in 1943, and also supports the view that tick fever is one of the most important diseases among African labourers in this district. *E. Hindle.*

HUME, W. E. & SZEKELY, P. **Cardiac Involvement in Spirochaetal Jaundice.** *Brit. Heart J.* 1944, July, v. 6, No. 3, 135–8, 2 figs. [21 refs.]

The authors review the available papers dealing with cardiac complications of spirochaetal jaundice and then give details of a case.

The patient, a seaman, aged 52 years, had fallen into the Thames 10 days before the onset of symptoms. He was admitted to the Newcastle General Hospital 10 days later and was then deeply jaundiced. His serum agglutinated *L. icterohaemorrhagiae* in titres up to 1 : 30,000 and the clinical features were typical of the disease. On the 13th day of illness the heart rhythm was found to be irregular and a cardiogram showed the presence of auricular fibrillation. The myocardial involvement was only transient and in the light of anatomical findings in fatal human cases and in infected guineapigs, it is considered to be the result of multiple haemorrhages or of direct toxic damage to the heart muscle, or both. *E. Hindle.*

ALSTON, J. M. & BROOM, J. C. **The Action of Penicillin on Leptospira and on Leptospiral Infections in Guinea-Pigs.** *Brit. Med. J.* 1944, Dec. 2, 718–19.

The authors tested the effect of penicillin on the growth of leptospirae in culture, and on leptospiral infections in guineapigs.

Nine strains of *Leptospira icterohaemorrhagiae* were used, including six human stains, two from rats, and one from a dog ; and also a strain of *L. canicola*. The growth of all these strains was prevented by adding penicillin in concentrations of 0·4 Oxford unit to 3·5 cc. culture medium before seeding with 0·25 cc. of a heavy culture of leptospira. With lower concentrations variation of sensitivity was found. In well grown cultures the addition of penicillin in concentrations of less than 15 Oxford units in 10 cc. had no apparent effect on leptospira and even in concentrations up to 240 Oxford units the organisms, although greatly diminished, were not entirely eliminated after three weeks' contact at 24°C.

Fifteen guineapigs were inoculated intraperitoneally with a virulent strain of leptospira ; 7 were treated with sodium penicillin in oil, begun 18 hours after infection, and 8 were left as controls. Each treated animal received a total of 12,000 units extending over 15 days, equivalent to more than 1,000,000 units for a man of 70 kgm. Four out of 8 control guineapigs survived and 6 of the 7 treated animals. Serum of all guineapigs recovering after penicillin treatment agglutinated *L. icterohaemorrhagiae* in dilutions of 1 : 30 or 1 : 100. Ten were reinoculated without showing any signs of infection.

Finally, the authors tested the toxicity of penicillin in guineapigs. Six normal animals were given 800 units of sodium penicillin daily for 15 days, and three weeks later 1,100 units twice daily for three and a half days, without any ill effects being observed, in opposition to the results recorded by HAMRE *et al.* (*Bulletin of Hygiene*, 1944, v. 19, 310) and also HEILMAN and HERRELL [see this *Bulletin*, 1944, v. 41, 1039]. *E. Hindle.*

HART, V. L. **A Case of Weil's Disease treated with Penicillin.** *Brit. Med. J.* 1944, Dec. 2, 720.

The patient, an Italian male aged 26, who had worked in ditches and canals, developed a typical attack of Weil's disease, diagnosis being confirmed by agglutination tests and the appearance of *Leptospira* in the alkaline urine on the 23rd day of the illness. They were still present on the 30th day when penicillin treatment was begun, 15,000 units every four hours continued until 315,000 units had been given. The penicillin did not seem to hasten recovery but the organisms disappeared from the urine two days after treatment had begun. *E. Hindle.*

YAWS AND SYPHILIS.

YOUNG, W. A. **Extra-Urethritic Cases in an African Venereal Diseases Hospital.** *Brit. J. Venereal Dis.* 1944, Dec., v. 20, No. 4, 141–54. [20 refs.]

No adequate abstract of this article is possible within a limited space and those who are interested are recommended to study the original in detail.

The author's theme is to show how common syphilis, yaws, chancroid and lymphogranuloma inguinale are in Africans, their relative incidence in East and West Africa, the impossibility of differential diagnosis and, in consequence, the difficulty of prescribing suitable treatment. Further, the difficulties are increased by the added complication of filariasis.

A series of 222 cases of venereal disease, other than gonorrhoea, is analysed and of these no less than 49 (22 per cent.) showed some degree of positivity with the Kahn, Ito-Reenstierna and Frei reactions ; 104 (47 per cent.) gave positive results with two reactions, but only 24 (11 per cent.) had a positive Kahn reaction alone and 38 (17 per cent.) positive Reenstierna reaction alone ; only one man had a positive Frei without a positive Kahn or Reenstierna. These facts give some idea of the complexity of the matter and this complexity was increased by the fact that one locally made Frei antigen appeared to act as Ducrey antigen as well.

Sores were so frequently due to more than one infection that differential diagnosis was virtually impossible whatever their characters ; separation of the various diseases according to the condition of the lymphatic glands seemed a little more hopeful ; in general, adenitis and periadenitis are characteristic of syphilis, periadenitis, especially when it extends to the skin, is characteristic of chancroid and cutaneo-periadenitis is characteristic of lymphogranuloma inguinale. This last was the only disease which could be identified with any degree of accuracy and was thought to constitute approximately 10 per cent. of the whole series.

From the foregoing it will be realized that treatment also presents a problem. The author considers that, taking all the factors into consideration, especially the "butterfly out-patient," treatment should be as intense and short as possible and that simultaneous short courses of mapharside, sulphapyridine and tartar emetic are the only practicable solution.

[No mention is made of granuloma venereum (granuloma inguinale) which may perhaps complicate matters further. Some might consider that in the treatment of Africans sulphanilamide is more suitable than sulphapyridine for chancroid and be led to wonder whether tartar emetic has much effect on L.i.]

T. E. Osmond.

LEPROSY

TRESPALACIOS, F. & JOVER, J. Notas sobre los niños nacidos en el Hospital "San Lázaro" Rincón, Cuba. [**Notes on Children born at the San Lázaro (Leper) Hospital, Rincón, Cuba.**] *Rev. Leprología, Dermatología y Sifilografía.* Marianao, Cuba. 1944, Oct., v. 1, No. 4, 193–8.

The authors discuss the hereditary or congenital transmission of leprosy and give brief notes of a series of 16 children born of leprous parents in the Leper Hospital, Rincón, Cuba. Their investigations were carefully carried out. PINEDA had recorded examining smears of the placenta and the centrifuged washings of it and finding among 104 such examinations 57 placental smears and 15 of the washings positive for lepra bacilli. In the present series of sixteen the parents were known to be leprous and examinations were made of the placental tissues, the umbilical cord, blood from the cord, and thick drops from the ear-lobe in each case. Six died at birth or soon after; nine are living and well; the ages of these ranged up to 8 years. Another could not be traced, for the mother refused to say where the child was. Those who died showed no signs of leprosy, the causes being obstetrical difficulties in the case of those born dead, others of gastro-enteritis, bronchopneumonia, etc., later. None of the examinations revealed any lepra bacilli. The living babies were removed from their parents to a home or other place of safety and they have, with the one exception mentioned, been kept under observation. All have so far remained free from any sign of leprosy. *H. Harold Scott.*

GRAU TRIANA, J. Nuevo fundamento y técnica para el cultivo del Mycobacterium Leprae. [**New Basis and Technique for Cultivation of** *Mycobacterium leprae.*] *Rev. Leprología Dermatología y Sifilografía.* Marianao, Cuba. 1944, Oct., v. 1, No. 4, 230–35, 1 fig.

An interesting description of an apparently logical procedure for cultivation of Hansen's organism, for which the author claims success; as it can be easily verified (or disproved) by other workers a full account is called for.

The author sketches briefly previous attempts to grow *Myco. leprae* and notes thereanent three points: (i) Their want of uniformity. (ii) The low percentage of positive results. (iii) The lack of confirmation by other workers. His line of argument is as follows: Hansen's organism strongly resembles that of tuberculosis in many features; why will not the former grow under conditions apparently the same as those which give a good yield of the latter? Study of this revealed that *Myco. tuberculosis* has several diastases—oxidase, catalase, esterase, tryptase, nuclease, reductase, and a peptic ferment. *Myco. leprae* on the other hand is poor in these and little is known about them. The next stage was to examine the general conditions in which cultivation has been carried out and the special properties of these diastases. Briefly, sterilization of the media for growing *Myco. tuberculosis* is usually carried out at 20 lb. pressure (127°C.) for 15 minutes or at 15 lb. (121°C.) for 20 minutes. Now oxidase action is inhibited by cold, but almost destroyed by heat, such as 60° or 70°C. for 10 minutes. We are not, therefore, dealing with a medium deficient in "chemical nutrients" but with one "biologically dead." *Myco. tuberculosis* can live and thrive in such a medium because the organism itself contains diastases in plenty, whereas *Myco. leprae* needs a medium with full enzymatic activity and therefore these must be added. A long series of experiments with oxidases, reductases, catalases and tryptases added to Petragnani's medium has shown that the essential is the first-named. The authors next discuss Keilin's work with Warburg on the cytochromes and concludes that Koch's bacillus is a "typical and

complete aerobe with its full complement of cytochromes", whereas Hansen's bacillus is a "facultative organism in which cytochrome oxidase is poor or lacking." On this basis he has used Petragnani's medium (but substituting peptone for the asparagin) and, after confirming its sterility by keeping it at 37°C. for 48 hours, adds, at the moment of sowing the organism (from emulsified lepromata, for example), 10 drops of a solution of oxidase from potato, which has been kept in the ice-chest. Care must be taken to ensure that the whole surface of the medium is bathed in the oxidase solution before the leprous material is sown. Laboratory details for preparing the oxidase solution are given. By this technique, says the author, colonies begin to appear in 5–7 days at 37°C.

Bearing in mind the avidity of certain salts, ferrous salts, for example, for oxygen, the author has tried adding a solution of ferrous sulphate, with good results. In a flask containing 50 cc. of distilled water is placed a "very small quantity of pure ferrous sulphate, for analysis." The solution is shaken and filtered, first through paper and then through an L3 bougie into a sterile flask. This solution will not keep and must be freshly prepared each time just before use. It is added to the medium in the same quantity as the oxidase, 10 drops to each culture tube. *H. Harold Scott.*

GRAU TRIANA, J., DE CASTRO PALOMINO, J. & CONDE MATEO, E. Poliformismo y cultivo evolutivo del bacilo de Hansen. [**Pleomorphism in Cultures of** *Mycobacterium leprae.*] *Rev. Leprología, Dermatología y Silfilografía.* Marianao, Cuba. 1944, Oct., v. 1, No. 4, 236–41, 1 coloured pl.

Following up the work recorded in the preceding abstract the authors offer an explanation of the varied morphology reported by those who have attempted to cultivate Hansen's bacillus. This seems to depend to a large extent on the method of culture. The authors have used four types: (1) A medium for rapid culture, with added potato oxidase; (2) A similar medium, but with ferrous sulphate instead of the oxidase; (3) For slow growth, for preservation and subcultivation, Petragnani's medium, with peptone for asparagin; (4) A medium of the following composition and mode of preparation:—

Proteose No. 3 Agar, Difco	4 gm.
Asparagin	1 ,,
Neutral glycerin	5 cc.
Oleic acid	1 gm.
Lecithin	1 ,,
Aqueous malachite green (2 per cent.)	3 cc.
Physiological saline	100 ,,

In a 500 cc. flask are placed the proteose, asparagin and saline; this is heated to dissolve the proteose. To this, while warm, are added the glycerin, oleic acid and lecithin; on cooling, the malachite green is added and the whole filtered through gauze and tubed and sterilized in the autoclave at 127°C, for half an hour, allowed to cool in an inclined position at laboratory temperature, then placed at 37°C, for 48 hours to test for sterility.

In four to seven days early colonies are visible on media 1 and 2. On medium 2 the organisms are coccoid, like meningococci, but growth soon ceases owing to the excess of free sulphuric acid present in passage of the ferrous to the ferric salt. On medium 1 the growth is of short, thick, acid-fast bacilli. If left on this medium or transferred to 3 they will multiply to cover the whole surface with a moist golden-yellow growth of acid-fast organisms. If the growth is transferred from 1 or 2 to medium 4 there is a remarkable change; the growth slows down and filamentous, branching forms appear, some with clubbed ends, like mycelia or actinomyces, which stain blue, while a few curved stout organisms

are acid-fast. The authors state that they have occasionally even seen spores. If transferred again from 4 to 1 the acid-fast bacillary form is resumed. These different forms are shown in a coloured plate. *H. Harold Scott.*

ARGÜELLES CASALS, D. Lepra y xantelasma. [**Leprosy and Xanthelasma.**] *Rev. Leprología, Dermatología y Sifilografía.* Marianao, Cuba. 1944, Oct., v. 1, No. 4, 242–4.

The association of these two conditions in the same patient, states the author, has been observed fairly often but no allusion to it is made in the text-books. It seems to occur in lepromatous cases, in later middle age, and if autopsy is undertaken leprous lesions are often found in the liver. The author cites three cases under his observation : In a woman of 66, another of 59, and a man of 65 years ; these were all among 33 lepromatous patients examined ; it was not seen in 22 others of the tuberculoid or non-specific types. The fact that hypertrophy of the liver is common in leprosy without disorder of liver function is ascribed to the infiltration affecting the periportal spaces and not the cellular structure of the organ. *H. Harold Scott.*

POIRIER, M. Note sur 15 cas de lèpre observés au service des contagieux du Val-de-Grace chez des Sénégalais. [**Fifteen Cases of Leprosy in Senegalese Soldiers seen at Val-de-Grace.**] *Bull. Soc. Path. Exot.* 1943, May 12 & **June** 9, v. 36, Nos. 5–6, 145–6.

ROIG, J. T. & RODRIGUEZ DE LA CRUZ, J. M. Los aceites de las flacurciáceas : sus propiedades. Aceites de las flacurciáceas Cubanas. [**The Essential Oils of the Flacurciaceae and their Properties. The Oils of Cuban Species.**] *Rev. Leprología, Dermatología y Sifilografía.* Marianao, Cuba. 1944, Oct., v. 1, No. 4, 256–66. [16 refs.]

By " properties " the authors imply the physical characters, not the therapeutic uses, of the various plants. They give the specific gravity at certain temperatures, the refractive index, the rotatory power, the index of saponification, etc., of the twelve chief species of *Taraktogenos* and *Hydnocarpus* (among the latter, *wightiana, anthelmintica, alcalae, hutchinsonii, ilicifolia, woodii,* and *subfalcata*) and then give the same information regarding the species which flourish in Cuba, namely, Guaguasi oil, *Zuelania guidonia* ; oil of Ranilla, *Laetia americana* ; oil of Rascabarriga, *Samyda grandiflora* ; oil of Jia blanca from the seeds of *Casearia alba*, and of Raspalengua obtained from *Casearia hirsuta.*

The oils of these three genera, *Zuelania, Laetia* and *Casearia* are very similar to those of *Hydnocarpus, Lindackeria* and *Carpotroche,* and in all of the Cuban plants gynocardic, chaulmoogric and gorlic acids are present. Moreover, as far as they have been tried, the esters of these Cuban oils are well tolerated when injected intramuscularly, and a plea is made for more extensive trial of them and for publication of the results observed. *H. Harold Scott.*

IBARRA PEREZ, R. & GONZALEZ PRENDES, M. A. Las sinominias de la lepra. [**Synonymy in Leprosy**] *Rev. Leprología, Dermatología y Sifilografía.* Marianao, Cuba. 1944, Oct., v. 1, No. 4, 267–75. [26 refs.]

VILLELA, G. G. & LINHARES, H. Lipídeos na pele de ratos com lepra murina. [**Skin Lipoids of Rats with Rat Leprosy.**] *Mem. Inst. Oswaldo Cruz.* 1943, Feb., v. 38, No. 1, 61–4, English summary.

HELMINTHIASIS.

WRIGHT, F. J. & ROBERTS, J. I. **A Creeping Eruption with Intense Eosinophilia in a Case of Infection by** *Schistosoma mansoni*. *East African Med. J.* 1944, Sept., v. 21, No. 9, 282–4, 1 chart.

During the early period of infection with *Schistosoma mansoni* a linear creeping eruption appeared in the skin of an Indian boy, aged nine years; he had paddled in Nairobi river [Kenya Colony] on March 29th, 1943 and next day had red and swollen legs up to the knees which he scratched owing to the irritation. On the third day after the paddling he vomited and had fever which recurred intermittently, in spite of treatment at a dispensary, until his admission to hospital on April 20th, three weeks after paddling. He showed oedema of the face, spasmodic cough at night, and urticaria on the thighs and legs. On April 24th a somewhat wavy semicircular line, about 6 inches long, appeared on the left thigh; it was raised, red and irritable but not painful or tender. The line grew, between 9 a.m. and 2.30 p.m., at the rate of 2 inches an hour. Two other semicircular lines, one beginning as an urticarial weal, appeared about the same time on the right thigh. These lines were sprayed with ethyl chloride and no further extension or urticaria appeared.

The stools showed ova of *S. mansoni* for the first time on May 5th, 1943; though examined several times a month, they were only found again once in August and again in March 1944; during this period several courses of injections with antimony compounds were given.

In May 1943, the blood contained 63,600 leucocytes per cmm., of which 60,800 (95·6 per cent.) were eosinophils. The leucocytosis gradually decreased during the following months to reach 10,000 in March 1944, the eosinophilia showing a parallel curve of decrease. *J. F. Corson.*

LE GALL, R. Les bilharzioses en Afrique Occidentale Française au Togo et à Madagascar de 1939 à 1941. [**Schistosomiasis in French West Africa, Togo and Madagascar, 1939-41.**] *Bull. Office Internat. d'Hyg. Publique.* 1944, Mar.-Apr., v. 36, Nos. 3–4, 116–26, 8 maps.

i. TÖTTERMAN, G. **Anemia Hyperchromica Diphyllobothrica.** *Acta Med. Scandinavica.* 1944, v. 118, No. 4–5, 402–9. [11 refs.]

ii. ——. **On the Occurrence of Pernicious Tape-Worm Anemia in Diphyllobothrium Carriers.** *Ibid.* 410–16. [11 refs.]

iii. ——. **Experiments with Injections of Stomach Extracts in Pernicious Anemia.** *Ibid.* 417–21. [15 refs.]

iv. ——. **Furthermore on the Question of the Pathogenesis of Pernicious Tape-Worm Anemia. A Preliminary Report.** *Ibid.* 422–9.

i. In the first of these four papers the author reminds us that *D. latum* may cause, in a fraction of the number of carriers of this tapeworm, a disease which is indistinguishable from cryptogenetic pernicious anaemia, and that both diseases are improved by liver and stomach preparations. Other anaemias have been ascribed to *D. latum*, *e.g.*, a hypochromic type, of which the author saw 10 cases, none of which was improved by anthelmintic treatment, so that he concluded that probably *D. latum* does not cause this kind of anaemia; and a light hyperchromic anaemia, sometimes almost normochromic (anaemia hyperchromica diphyllobothrica), which does improve after anthelmintic treatment without any other treatment. This latter anaemia was described by G. BECKER (*Finska Läk. sällsk, Hdl.*, 1915, v. 57, 513) and by TÖTTERMAN [this *Bulletin*, 1940, v. 37, 215]. The present paper records the study of 24

cases of this kind of anaemia (15 women, 9 men), all adults. The anaemia in all was "very moderate." In the 15 women the haemoglobin percentage was 72–96, average 83; the erythrocytes numbered 3,430,000 to 4,376,000, average 3,949,000; the colour index was 1·01 to 1·10, average 1·05. In the nine men the haemoglobin percentage was 68 to 100, average 87; the erythrocytes numbered 3,110,000 to 4,600,000; the colour index was 1·00 to 1·12, average 1·08. Gastric acidity was normal and there was no connexion between the secretion of HCl and the anaemia.

A vermifuge was given to 12 of the 24 patients and the blood picture became normal "in some weeks" without other treatment. To the other 12, injections of a liver preparation called Heptomin Medica were given in doses which had caused complete improvement of the blood picture in cases of pernicious anaemia. In one of these 12 cases all traces of the anaemia disappeared in one month; in five of them there was a distinct, but not a complete, improvement; but a vermifuge did improve them. In the remaining six cases the liver preparation appeared to have no effect upon the anaemia, but in four of them a vermifuge noticeably improved the blood picture. If this hyperchromic anaemia had been a primary stage of tapeworm pernicious anaemia, as RAGOZA (*Fol. haemat. Archiv.*, 1915, v. 19, 269) has suggested, the liver preparation should have been, Tötterman argues, at least as effective in these cases as it is in tapeworm pernicious anaemia. The author thus concludes that this light hyperchromic anaemia and tapeworm pernicious anaemia are not different stages of the same disease, but are distinct conditions. The light hyperchromic anaemia is perhaps due to absorption of tapeworm toxins and is comparable to "experimental poison anaemias in animals." The absorption of tapeworm toxins will not alone cause tapeworm pernicious anaemia; other factors must collaborate to produce this. This explains why tapeworm pernicious anaemia is so much less frequent than light hyperchromic anaemia.

ii. In the second of these four papers the author discusses the literature on the occurrence of tapeworm pernicious anaemia in carriers of *D. latum* and gives the results of his own study of its incidence. EHRSTRÖM, R. (*Finska Läk. sällsk. Hdl.*, 1926, v. 68, 685) calculated that tapeworm pernicious anaemia will occur in only 1 in 5,000 to 10,000 cases of infestation with *D. latum*, but he based these figures on estimations made by provincial doctors and Tötterman thinks that the figures are very unreliable. SEPPÄ, T. (*Duodecim*, 1927, v. 43, 101) examined patients admitted to a military hospital and found a proportion of one case of tapeworm pernicious anaemia in 659 cases of infestation with *D. latum*. SCHAUMAN, O. (*Akad. Abh.*, Helsingfors, 1894), studying clinical material, gave an incidence of one case in 100. BECKER, G. (*Finska Läk. sällsk., Hdl.*, 1915, v. 57, 513) gave an incidence of one case in 168, these figures being based on his private practice. Both the latter authors thought, however, that their figures were too high.

Tötterman studied civilians and soldiers admitted to a war hospital during the 18 months between July 1st, 1942, and December 31st, 1943. In 1943 the stools of practically all the patients were examined, but in 1942 they were not, as a rule, examined. In the second half of 1942 *D. latum* was found in 151 of 850 military patients (17·8 per cent.) and in 154 of 233 civilians (66 per cent.); in "polyclinical material" comprising 273 civilians *D. latum* was found in 113 (41·4 per cent.). In 1943 *D. latum* was found in 275 of 1,896 military subjects (14·5 per cent.) and in 245 of 410 civilian subjects (59·75 per cent.) and in 209 out of 379 "polyclinical" civilians (55 per cent.). Tötterman thinks that the 14·5 per cent. incidence in the 1943 military patients is almost an "exact fact" for the Finnish Army, because the subjects examined came from all over that country; and that 14 per cent. is an approximate mean value for the incidence over the whole of Finland.

Discussing the diagnosis of tapeworm pernicious anaemia Tötterman states that it must be hyperchromic and also very pronounced [contrast the "very moderate" anaemia in the first paper] and must respond to treatment with liver preparations or by expulsion of the worm. During the latter part of 1942, 15 cases of tapeworm pernicious anaemia were treated and the author gives figures from which he calculates that the frequency of tapeworm pernicious anaemia was 1 : 136 among civilians and 1 : 113 among soldiers. In 1943 decidedly fewer cases occurred. The incidence then was 1 : 383 among civilians and 1 : 261 among soldiers. These figures represent, the author thinks, the true incidence. He is inclined to ascribe the higher frequency of the anaemia in 1942 to the difficult food conditions in that year and perhaps also the lack or scarcity of Castle's extrinsic factor. During the war KERPPOLA (personal communication to the author) obtained good results by treatment with yeast, which is rich in extrinsic factor. The author considers that his own figures, obtained during a time of food difficulty, may be the highest possible, while SEPPÄ's figure of 1 : 659, obtained from the study of conscripts in normal times, may be the lowest possible.

iii. In the third of these four papers the author discusses earlier work on the use of intramuscular injections of gastric juice for pernicious anaemia. For this treatment excellent results have been claimed. He also discusses the use of injections of stomach extracts. He describes his own method of making extracts of hog's stomach. Two extracts of the fundus of the stomach only were given intramuscularly to one case of cryptogenetic pernicious anaemia and to one case of tapeworm pernicious anaemia. No improvement resulted in either case. Five extracts were made from hog's stomach from which the fundus had been removed. These were injected in large doses into five patients with cryptogenetic pernicious anaemia and into one with tapeworm pernicious anaemia. Four of the cases of cryptogenetic pernicious anaemia did not improve; one case improved slightly. The case of tapeworm pernicious anaemia also improved slightly. When the extracts made without the fundus were given by the mouth to one patient with cryptogenetic pernicious anaemia (15 gm. were given four times a day for 10 days) no improvement resulted.

These negative results are contrary to those obtained by some of the earlier investigators whose work is discussed.

iv. In the fourth of these papers the author supports the view that tapeworm pernicious anaemia occurs in patients who have become sensitive to the tapeworm. He had previously found (presumably, *Acta med. scand.*, 1938, v. 96, 268) that when patients who had had tapeworm pernicious anaemia were given small doses by the mouth of dried tapeworm, or alcoholic extracts of them, the blood picture declined in the direction of pernicious anaemia. This did not seem to occur in healthy subjects or in cases of cryptogenetic pernicious anaemia. Tötterman discusses von BONSDORFF's criticism [this *Bulletin*, 1940, v. 37, 216] of this view, pointing out that von Bonsdorff used for his work chiefly aqueous extracts of the tapeworm, whereas Tötterman insists that they must be alcoholic.

To study the problem further Tötterman extracted *D. latum* for one week with equal parts of ether and 96 per cent. alcohol, filtered the extract and evaporated it slowly on a water bath. The residue was suspended in almond oil and sterilized in a water bath. Each gramme of this almond oil extract contained the extract from 10 gm. of tapeworm. Each dose of it given daily by intragluteal injection was 0·5 cc.

Case 1 had no anaemia and no *D. latum*. He was given 0·5 cc. of the extract daily for 19 days. The haemoglobin and number of erythrocytes did not increase; the eosinophils rose from 1·5 to 7·5 per cent.

Cases 2 and 3 had no anaemia but had *D. latum*. Case 2 received 0·5 cc. of extract daily for 14 days and showed slight decrease of both haemoglobin and number of erythrocytes, but these both improved again later, although the injections continued. The eosinophils increased "somewhat." Case 3 received 0·5 cc. "almost daily" for five weeks. During the first three weeks the haemoglobin decreased from 97 to 85 per cent.; the erythrocytes decreased from 4,790,000 to 3,960,000; but both increased again later, although the injections were being continued. The eosinophils increased up to 17·5 per cent.

Case 4 had had typical tapeworm anaemia which had been completely cured by anthelmintic treatment. Given 0·5 cc. daily for 12 days the haemoglobin of this patient decreased "with 16 per cent." and the erythrocytes "with 1 million" in two weeks; the colour index and eosinophils were not changed. The injections were discontinued because of the deterioration of the patient's condition; the blood values then rose until, in three weeks, they were the same as they had been at the beginning.

Case 5 had recovered two months earlier from tapeworm pernicious anaemia after anthelmintic treatment. Given 0·5 cc. of extract daily for 15 days, this patient showed a decline of haemoglobin from 101 to 90 per cent. The eythrocytes declined rather more than 700,000. The colour index rose from 1·01 to 1·07 and the eosinophils from 2 per cent. to 17·5 per cent. The injections were discontinued and in three weeks the patient's blood picture improved spontaneously and the eosinophils returned to 5 per cent. Another test was done with a new extract made by dissolving the ether-alcohol extract in petrol-ether, evaporating the petrol-ether and suspending the residue in almond oil, a pure lipoid extract being thus obtained. For two weeks the patient received 2 cc. of this daily. The haemoglobin was reduced from 97 to 94 per cent., the erythrocytes by 300,000, the colour index rose from 1·01 to 1·04 and the eosinophils from 5·5 per cent. to 10·5 per cent.

Nyfeldt, using Bothriotoxin, found that, when constant doses were used, the blood changes gradually disappeared, as they did in cases 3 and 4 above; only when the doses were continually increased did Nyfeldt find some hyperchromic anaemia in the animals he used. Tallqvist took by the mouth increasing doses of tapeworm lipoids and caused hyperchromic anaemia. Tötterman suggests that the increase of eosinophils obtained by him indicated that the tapeworm toxins in his extracts were "genuine." He concludes that his results correspond well with his earlier results obtained by giving by the mouth small doses of dried *D. latum* or alcoholic extracts of it; and that they support his earlier conclusion that hypersensitiveness to *D. latum* toxin plays an important part in the pathogenesis of tapeworm anaemia.

G. Lapage.

O'Connor, N. **Infestation by Two Types of Tapeworm.** [Correspondence.] *Brit. Med. J.* 1944, Dec. 2, 737.

A man and his wife who had lived for many years near the River Erne, Ireland, were infested with *Diphyllobothrium latum* and the wife was also infested with *Taenia saginata*. Both habitually ate perch, pike and eels, but not trout, and the wife frequently ate under-cooked meat and raw pork. After receiving anthelmintic treatment the man passed a worm 11 feet long and his wife passed a mass of worms in which one head of *T. saginata* and 35 heads of *D. latum* were found. Blood films of the man were normal while those of his wife showed 11 per cent. of eosinophile leucocytes. The author gives references to other records of infestation with *D. latum* in Ireland, all of which were in the county of Leitrim, near the River Shannon [this *Bulletin*, 1918, v. 12, 191; 1931,

v. 28, 200 ; *Lancet*, 1916, Feb. 26, 466 ; *Irish J. Med. Sci.*, 1929, 6 ser., 95 ; *Ibid.*, 1935, 6 ser., 188. See also this *Bulletin*, 1944, v. 41, 857 & 858]. *J. F. Corson.*

v. Hollósy, K. Spulwürmer als Ursache der Darmperforation. [**Nematodes as a Cause of Intestinal Perforation.**] *Zent. f. Chirurgie.* 1942, Dec. 19, v. 69, No. 51. 1990–92.

Laser, H. **The Oxidative Metabolism of** *Ascaris suis.* *Biochem. J.* 1944, v. 38, No. 4, 333–8, 10 figs. [21 refs.]

Oliver-González, J. & Bercovitz, Z. T. **Precipitin Reactions with Antigen prepared from Microfilariae of** *Wuchereria bancrofti.* **(Preliminary Report).** *Amer. J. Trop. Med.* 1944, Sept., v. 24, No. 5, 315–16.

An antigen was made as follows from the microfilariae of *Wuchereria bancrofti* : citrated blood containing many microfilariae was diluted with ten times its volume of a 2 per cent. solution of saponin in normal saline and centrifuged at 2,000 r.p.m. for 10 minutes ; the sediment was again washed with the saponin solution, several times with normal saline, and finally with distilled water, and dried in a vacuum. It contained microfilariae and leucocytes but no red cells. Normal blood was similarly treated as a control.

For the precipitin test a 1 per cent. suspension of the powdered dry antigen in normal saline was used at dilutions of from 1 : 100 to 1 : 25,600 ; this was placed above undiluted serum in small tubes for a ring test, which was read after 1 hour at room temperature.

The test was applied in 26 cases with microfilariae in the blood but with no signs or symptoms of the disease, in 14 cases with signs and symptoms but with no microfilariae in the blood, and in 10 normal controls. The result was positive in two of the 26 patients, at dilutions of 1 : 1,600 and 1 : 800, respectively, and in three of the 14 patients, at dilutions of 1 : 3,200 (2), and 1 : 1,600 ; it was negative in all the controls. An extract of dried leucocytes was tested in the group of 14 sera and in the 10 controls with negative results in all.

The authors make no comment on the results. *J. F. Corson.*

Mazzotti, L. Examen de 400 diafragmas humanos en la ciudad de Mexico para investigar triquinosis. Consideraciones sobre el examen de 1,000 diafragmas. [**Examination of 400 Human Diaphragms in the City of Mexico for the Study of Trichiniasis, with a Discussion of the Results of the Examination of 1,000 Diaphragms.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1944, June, v. 5, No. 2, 157–61. English summary.

The author examined 400 human diaphragms in the City of Mexico by compression of 10 gm. of muscle and digestion of samples negative to compression. By compression 46 (11·5 per cent.) were positive, while 354 were negative both by compression and digestion. Negative results obtained by digestion were due, the author thinks, largely to digestion of calcified cysts [*cf.* Mazzotti and Pastrana, this *Bulletin*, 1944, v. 41, 958]. Previously Mazzotti, and Chavira [*ibid.*, 1944, v. 41, 861] examined 600 diaphragms in the City of Mexico. Of these 527 were examined by digestion of only 2 gm. of muscle and 19 were positive. By digestion of the remainder of the muscle sample, two more were positive. Thus 21 out of 527 diaphragms were positive (4 per cent.). The remaining 73 were examined by compression of 10 gm. muscle, supplemented by digestion of samples negative to compression. Of the 73, 9 (12·3 per cent.) were positive.

Thus 473 were examined by compression of 10 gm. of muscle (*i.e.* 73 of the 1943 series and 400 of the present series). Of these 473 samples, 57 were positive by compression and none by digestion, making a total of 12 per cent. positive. Of the total of 1,000 diaphragms (400 of the present series and 600 examined by MAZZOTTI and CHAVIRA (*loc. cit.*)), 76 were positive (19 by examination of 2 gm. muscle and 57 by examination of 10 gm. muscle), the total percentage of positives being thus 7·6. PERRIN (*Ciencia*, 1939, v. 3, 108–114) examined 200 diaphragms in the City of Mexico by compression only and found 25 (12·5 per cent.) to be positive. Adding Perrin's 200 to the 600 of Mazotti and Chavira and the 400 recorded in this paper, the percentage incidence in the City of Mexico works out at 8·5 per cent., which is probably below the actual figure, because 527 were examined by compression of only 2 gm. of muscle, a method which the author considers to be defective. He suggests that the 12 per cent. of positives obtained by compression of 10 gm. of muscle is nearer the true figure.

The author concludes that the compression of 10 gm. of muscle is more effective than the usual method of compression of a small portion and digestion of a larger portion. But, when infestations with live larvae are light, digestion will probably reveal infestations which are missed by compression. Digestion is costly and laborious and further work will show whether it should be used for routine work or only in special cases. *G. Lapage.*

SPRUE.

COOK, A. B. **A Vitamin B Deficiency Syndrome allied to Sprue.** *Indian Med. Gaz.* 1944, Sept., v. 79, No. 9, 429–37. [13 refs.]

Every practitioner in Gujerat is familiar with the triad of diarrhoea, glossitis and anaemia. Hardly a day passes without a typical case being seen. There is some doubt whether this is classical sprue or the expression of some vitamin B deficiency allied to it.

The salient features are :—*Copious watery diarrhoea*, the stools being yellow or white. *Glossitis* : The tongue is inflamed, usually clean with red spots or glazed in appearance. Glossitis may precede the diarrhoea, may accompany or follow it. *Pigmentation of the skin* is reflected in black knuckles and sallowness of the face.

The critical difference between this and classical sprue lies in the nature of the motions ; the porridge-like bulky, frothy stool of sprue is seldom seen. Undoubtedly this must be regarded as a member of the " sprue syndrome " and the well-appreciated deficiency in the diet of Indians of the vitamin B complex, the reaction of these patients to its administration, lead to the conclusion that the syndrome is due to B deficiency. Another observation which lends force to this argument is that several cases may be met within one family. The disease, then, is the most serious nutritional defect in Gujerat. Dyspepsia is a prominent feature. The patient complains that he is unable to eat. Prominent are gurgling in the abdomen and urgent desire to defaecate after food. Constitutional effects are loss of weight, exhaustion and weakness, lack of mental power and inability to concentrate.

Paraesthesiae are frequently complained of, especially tingling and burning of legs, soles of feet and palms of hands. There may be loss of knee jerks. Fever of low degree may often be observed. The skin may be dry and scaly

over the forearms and legs, and signs of loss of weight evident. In advanced cases oedema is due to hypoproteinaemia. Low blood pressure readings are constant.

It is realized that for every fully-developed case there may be several which exhibit but part of the syndrome.

The anaemia is typical of the megalocytic type, and the colour index 0·9 or higher. There may be absolute achlorhydria or hypochlorhydria. Only two showed a practically normal curve. The glucose tolerance curve was of the flattened type.

The typical appearance of the rectal mucosa by sigmoidoscope is that of a pale, thin-walled mucous membrane, but in acute relapse it may be reddened and oedematous. In this syndrome there may be no increase of fats in the faeces.

The syndrome is definitely relieved by therapy supplying the vitamin B complex by the mouth in the form of nicotinic acid or riboflavin, or in extreme cases by injection of the former, which definitely controls vomiting and has an effect on the glossitis.

Thirteen cases are quoted in which this syndrome was precipitated by pregnancy, but the general explanation put forward is that the mechanism of this syndrome is implanted on dysentery. A conditioned deficiency of vitamin B due to dietetic restriction, or defective absorption, leads to jejuno-ileal insufficiency and it is possible to trace the change over from a colitis to disorder of the small intestine. Acute relapses may mimic dysentery.

P. Manson-Bahr.

CHAUDHURI, R. N. & RAI CHAUDHURI, M. N. **Para-Sprue. A Study of 22 Cases.** *Indian Med. Gaz.* 1944, Sept., v. 79, No. 9, 404–8, 1 chart. [10 refs.]

Chronic diarrhoea with sore mouth and anaemia suggestive of sprue has long been recognized in Bengal as a chronic deficiency disease. For this condition the term " para-sprue " has been employed.

The subjects of this study were 22 patients, comprising 6 Europeans, 4 Anglo-Indians and 12 Indians—in all 16 males and 6 females.

The duration of the illness extended for six months to two years—with an average of one year. A previous history of dysentery or colitis was obtained in 14 cases.

The onset was insidious, the number of stools varying from 2 to 4 in 10, 5 to 10 in a similar number and more than 10 in 2. In eight the diarrhoea was watery, pale and frothy sometimes, with mucus or mucus and occasional blood in the remaining six.

All, except one, had sore tongue. Other symptoms included loss of weight, flatulency in eleven, anorexia in nine, low fever in four, and nausea in two. Twelve were emaciated, six had oedema of legs, the abdomen was soft, flabby and distended. The right iliac fossa was tender in four and the colon palpably thickened in six. Blood examination showed four markedly anaemic (haemoglobin 6·6 gm. or less): seven moderately anaemic and eight slightly so. The anaemia was macrocytic and hyperchromic, and leucopenia was present in a third of the cases. The sedimentation rate was variable, being 20 mm. or less in nine out of 20 cases. By keeping each patient on a standard diet, containing no more than 100 gm. of fat for three consecutive days, the total fat was 20 to 25 per cent. of the weight of dried faeces in nine, 26 to 30 per cent. in seven, 31 to 33 per cent. in five and 42 per cent. in one only. In most cases it was adequately split.

The glucose curve showed that, in half, glucose absorption was poor, but power to use it remained unaffected.

Treatment consisted of a diet as liberal as possible according to the patient's condition; those with much diarrhoea and anorexia had liquids, often supplemented by intravenous glucose.

In the six who received no medicine the stools became formed soon after the diet was changed from low caloric fluids to a well-balanced diet along with parenteral liver extract. Five had sulphaguanidine in the customary doses and this appeared most efficacious in stopping diarrhoea. Liver (Lilly's T.C.F.) in crude extract was injected in all cases.

For achlorhydric patients dilute hydrochloric acid and glycerin of pepsin were prescribed; two had marmite and one nicotinic acid and riboflavin.

Marked improvement resulted in all but one who died. The weight increased by 25 to 30 lb. in two, by 10 to 20 lb. in five.

Para-sprue constitutes a distinct disease and occurs not only in poor Indians, but also in well-to-do Europeans and Anglo-Indians. A history of previous dysentery or colitis is general.

The main distinguishing features from sprue are: the racial distribution; the type of stool and chemical composition; the absence of extreme emaciation and peculiar waxy pallor; and the improvement on parenteral liver extract in the absence of strict dietary regime. *P. Manson-Bahr.*

HARRISON, H. E., TOMPSETT, R. R. & BARR, D. P. **The Serum Potassium in Two Cases of Sprue.** *Proc. Soc. Exper. Biol. & Med.* 1943, Dec., v. 54, No. 3, 314–15.

"Two cases of sprue are reported in which the values of the serum potassium were found to be at low levels, 1·1 meq/L to 1·6 meq/L [milli-equivalents per litre], before the institution of treatment."

DE FIGUEIREDO, F. V. O primeiro caso de spruw tropical no Brasil. [**The First Case of Tropical Sprue in Brazil.**] *Hospital.* Rio de Janeiro. 1943, July, v. 24, No. 1, 121–38, 6 figs. [41 refs.]

A continuation of the paper abstracted in this *Bulletin*, 1943, v. 40, 261, and dealing with diagnosis.

WILDER, R. M., Jr. **The Nontropical Sprue Syndrome: Report of Four Cases and of a Case in which Intestinal Insufficiency was corrected by Operation.** *Proc. Staff Meetings Mayo Clinic.* 1944, June 14, v. 19, No. 12, 297–302.

HAEMATOLOGY.

AHMAD, N. **Macrocytic Anaemia. The Unknown Haemopoietic Factor in Whole Liver and Yeast.** *Indian Med. Gaz.* 1944, Sept., v. 79, No. 9, 414–18. [13 refs.]

NAPIER in 1938 recognized that macrocytic anaemias in the tropics, including those of pregnancy, could be grouped (on therapeutic grounds) into (*a*) curable with refined liver extracts (anahaemin) or marmite, (*b*) curable with crude liver

extracts or marmite, and (*c*) curable with campolon. It is now claimed that a fourth group exists which resists campolon, but yields to *whole* liver or yeast. However, this anti-anaemic substance has not yet been identified. In such refractory cases clinical evidence suggests that deficiency of nicotinic acid exists ; alternatively, whole liver or yeast may be employed in treatment.

Five illustrative cases are cited. The anaemia resisted parenteral liver during the second and fourth attack in cases 1, 2, and 4 ; in the late stages of the first attack in cases 3 and 5 when signs indicating secondary pellagra could be detected. These and other facts suggested that resistance to parenteral liver developed only when nicotinic acid deficiency reached a certain degree of intensity.

The author concludes that nicotinamide depletion in the body can reach a stage when the supply of known anti-anaemia factors, in the form of parenteral liver extract and marmite, cannot produce blood regeneration ; in such cases exhibition of nicotinic acid alone or in combination with other routine treatments may act almost dramatically in bringing the blood picture to normal.

It is further suggested that nicotinic acid is the factor that acts when cases refractory to parenteral liver rapidly yield to whole liver or yeast.

P. Manson-Bahr.

VALENTINE, W. N. & NEEL, J. V. **Hematologic and Genetic Study of the Transmission of Thalassemia (Cooley's Anemia : Mediterranean Anemia).** *Arch. Intern. Med.* 1944, Sept., v. 74, No. 3, 185–96, 5 figs. [22 refs.]

This is a study of three cases of Cooley's anaemia, or thalassaemia, and of one case of a milder but similar form of anaemia ; the latter was first described by WINTROBE *et al.* (*J. Amer. Med. Ass.*, 1940, v. 114, 1530) and later by DAMESHEK (*Amer. J. Med. Sci.*, 1940, v. 200, 445) as " target cell anaemia," and by STRAUSS *et al.* (*Amer. J. Med. Sci.*, 1941, v. 201, 30) as " familial microcytic anaemia ". The authors have collected haematological and genetic data from 34 members of the four families studied.

They state that it must be regarded as established that a mild familial anaemia, qualitatively similar to thalassaemia, may be present in both the parents, and many of the siblings, of patients who have thalassaemia. Three chief theories have been advanced : (1) thalassaemia is produced when the genetic causal factor is homozygous, the mild anaemia being produced when it is heterozygous, *i.e.* the factor is either an incomplete recessive or a semi-dominant factor ; (2) both conditions are due to a dominant factor which is variously expressed, *i.e.* one person, heterozygous for the factor, may develop extreme thalassaemia while another person may only have mild anaemia ; (3) thalassaemia is caused by the simultaneous presence of two non-allelomorphic dominant factors, one being inherited from each parent. The authors have examined the data of other workers statistically and discuss the results. Pending the collection of further data they think that the most satisfactory hypothesis is that of an incompletely recessive factor being the cause.

Certain persons are carriers of the disease ; the criteria for diagnosis are discussed and the pitfalls that may lead to erroneous diagnosis are mentioned. The authors state that " thalassaemia is the first inherited condition of any medical importance in which it seems possible to detect carriers with a high degree of accuracy."

With regard to the terminology of the two conditions, the authors suggest the terms " thalassaemia major " and " thalassaemia minor " ; the latter must

be distinguished from: iron deficiency anaemia, the splenomegalies, lead poisoning, rheumatic fever, and from other conditions in which target cells are present. *J. F. Corson.*

DIWANI, M. **Erythroblastic Anaemia with Bone Changes in Egyptian Children. Possible Cooley's Type.** *Arch. Dis. in Childhood.* 1944, Dec., v. 19, No. 100, 163–8, 11 figs. [13 refs.]

Three cases of Cooley's anaemia are described; the first was in a Greek girl, aged 4½ years, the second in an Egyptian boy, aged 10 years, and the third in an Egyptian girl, aged 6 years. Photomicrographs of the blood and radiographs of the bones are shown; a radiograph of the chest of Case 2 shows great enlargement of the heart. Details are given of the blood pictures, haemoglobin content, Van den Berg reaction, icteric index, fragility test, Wassermann reaction, the sternal marrow, and the bleeding time and coagulation time. The stools were examined for parasites in the Egyptian children, with negative results in both. *J. F. Corson.*

VENOMS AND ANTIVENENES.

DE, S. S. **Physico-Chemical Studies on Haemolysin. Part I. Crystalline Haemolysin (Lecithinase).** *Ann. Biochem. & Exper. Med.* 1944, v. 4, No. 1, 45–56, 3 figs. [20 refs.]

Several research workers have separated—at least have claimed to have separated—haemolysin from neurotoxin of snake-venoms; for example, DUNN who separated cephalinase from *Crotalus adamanteus* venom [this *Bulletin*, 1935, v. 32, 377], FAUST ophiotoxin, a glucoside-like substance from cobra venom, among others. These, however, were not successful in separating the haemolysin in a pure state. This the author has set out to do from the venoms of *Naja tripudians*, monocellate and binocellate varieties, and of *Bungarus fasciatus*. GHOSH and DE [this *Bulletin*, 1938, v. 35, 430] and GANGULY and MALKANA [*ibid.*, 1937, v. 34, 642] separated it from cobra venom by use of NaCl and purified it by heating to 86°C. and subsequent cataphoresis. In 1939 Dr. De devised two methods for purification of the haemolysin resulting in an elevenfold concentration of it [this *Bulletin*, 1940, v. 37, 461 (see also 512 and 513)]. These methods are complicated and the author has now evolved another for obtaining the haemolysin in crystalline form and he gives in this article the details of his procedures. Those working on this line of research should consult the original where the minutiae of the methods used are given; they cannot be abstracted; suffice it to say that he has obtained a product which, in the case of the monocellate variety of *N. tripudians*, is 17·5 times as active, haemolytically, as the crude venom, of the binocellate variety 14·3 times as active, and of *Bungarus fasciatus* 25 times.

He then compared the toxicity (lethality) of the venoms with that of the crystalline haemolysins and found that the m.l.d. for the monocellate and binocellate *N. tripudians* venoms were 0·1 and 0·085 mgm. respectively, and of *B. fasciatus* 1·6 mgm., whereas the relative amounts of the crystalline haemolysins were 2·4 mgm. for the varieties of *Naja* and 4·0 mgm. for *Bungarus*

fasciatus. Pigeons of 300 gm. weight were the experimental animals used. He verified the purity of his crystalline haemolysins by the solubility and cataphoretic methods. *H. Harold Scott.*

FLECKER, H. **More Fatal Cases of Bites of the Taipan** (*Oxyuranus scutellatus*). *Med. J. Australia.* 1944, Oct. 7, v. 2, No. 15, 383–4.

URETA, R. E. Latrodectismo, loxoscelismo y aracnoidismo benigno. [**Injuries caused by** *Latrodectus* **and** *Loxosceles*, **and Benign Injuries due to Spiders.**] *Rev. Med. de Chile.* 1944, Aug., v. 72, No. 8, 699–704.

A general account.

DERMATOLOGY AND FUNGOUS DISEASES.

QUILL, L. M. & BURCH, J. C. **Surgical Manifestations of Coccidioidomycosis.** *Ann. Surgery.* 1944, Oct., v. 120, No. 4, 670–78, 6 figs. [25 refs.]

After reviewing the history of coccidioidal granuloma, the authors describe four cases of the disease which were brought to their notice because the clinical features suggested some surgical condition. Case 1 was diagnosed as appendicitis, but the microscopical examination of "tubercles" found on the mesentery of the appendix showed these to be coccidioidal granuloma. The disease became generalized and progressed rapidly to a fatal termination; the total duration of illness was approximately two months. Case 2 presented a spinal lesion, with an associated abscess pointing in the right groin, which was diagnosed as "Pott's disease." Tuberculosis was not proved, but currettings of the diseased bone showed the "spherules" of *Coccidioides immitis*. After an illness of four months the patient died of the generalized disease. Case 3 presented the clinical features of pneumonia with an enlarged lymph node in the right side of the neck. Microscopical examination of the excised lymph node led to the diagnosis of coccidioidal granuloma. The disease rapidly became generalized and death occurred after an illness of two months. Case 4 presented a left sacro-iliac abscess. A second abscess developed over the sternum and *Coccidioides immitis* was found in the pus; abscesses appeared in other parts and the patient died of the generalized disease after an illness of about four months.

In every case the diagnostic coccidioidin skin-sensitivity test gave a negative result, which the authors attribute to the "overwhelming" nature of the infection associated with its rapid generalization. However, the diagnoses were promptly made by the demonstration of *C. immitis* in the pus or tissue, which was "surprisingly easy." Moderate leucocytosis with some degree of eosinophilia was a feature of these cases. All four patients were soldiers in training in the State of Texas when the diagnosis was made, and, as none had a history of residence in an endemic area elsewhere, it seems that the infection was contracted in that State. *J. T. Duncan.*

LEON Y BLANCO, F. & ANGEL ABALO, M. Rinosporidiosis: presentación del primer caso Cubano. Revisión de la literatura. [**Rhinosporidiosis. Report of the First Case in Cuba. Review of the Literature.**] *Rev. Leprología, Dermatología y Sifilografía.* Marianao, Cuba. 1944, Oct., v. 1, No. 4, 213–29, 4 figs. & 1 pl. [80 refs.]

The patient was a little girl, 10 years old, of Cuban parents; she had lived always in Candelaria in the Province of Pinar del Rio. In June 1943, she was

brought to hospital on account of obstruction of the left nostril by a tumour which had been growing steadily since it had first been noticed, eight months before. It was now the size of a large filbert; it was removed and the base cauterized. It showed the characteristic histological features of *Rhinosporidium*. The remainder of the paper is taken up with an account of the literature of the subject since SEEBER's first description in 1896 to the present, with notes of cases reported and a description of the pathological histology taken [as is frankly acknowledged by the authors] from ASHWORTH's article in the Transactions of the Royal Society of Edinburgh [this *Bulletin*, 1923, v. 20, 451]. There are four microphotographs and a reproduction of Ashworth's plate. The article is well documented. *H. Harold Scott.*

HEAT STROKE AND ALLIED CONDITIONS.

PITTS, G. C., JOHNSON, R. E. & CONSOLAZIO, F. C., with the technical assistance of J. POULIN, A. RAZOYK & J. STACHELEK. **Work in the Heat as affected by Intake of Water, Salt and Glucose.** *Amer. J. Physiol.* 1944, Sept. 1, v. 142, No. 2, 253–9, 1 fig. [18 refs.]

This paper deals with the performance of work by fully acclimatized men working in the heat *intermittently*. Therefore, in the authors' words, "the results are applicable to steel-workers, miners, and soldiers in the desert, all of whom usually do a day's work in the heat, and spend the rest of the time in cooler surroundings."

The subjects marched uphill on a treadmill, for one to six hours a day, either in dry heat (100°F., 30 per cent. relative humidity) or in wet heat (90–95°F., 83 per cent. relative humidity). In all experiments measurements were made at intervals of pulse-rate, rectal temperature, and rate of sweating. In some cases oxygen uptake, plasma protein, and plasma chloride concentration were also measured.

The first variable investigated was water intake. When no water at all was given, pulse rate and rectal temperature rose steadily, and never reached a plateau; the rate of sweating steadily declined; mechanical efficiency decreased, as shown by an increase in the rate of oxygen consumption for a given amount of work; plasma protein and plasma chloride concentrations rose. The effects were essentially the same in both moist and dry conditions; the moist heat evidently imposed the greater strain, because the rate of sweating was about 50 per cent. greater than in the dry heat. In the most extreme moist heat very few subjects were able to complete two hours' work without water.

When water was given, all these ill-effects were avoided. Rises in pulse-rate and rectal temperature were moderate and not progressively increasing; there was no decline in rate of sweating or in mechanical efficiency, and no rise in plasma chloride or protein. Most important of all, the subjects were able to work for a full period of six hours. It should be emphasized that, in order to obtain the best performance, water must be given *in amounts equal to the volume of sweat lost*. When it is given *ad libitum*, performance is not so good. This is because, as first pointed out by DILL, ADOLPH, and co-workers, at high rates of sweating thirst is apparently not an adequate stimulus for the *immediate* replacement of the fluid lost. The amount of water drunk in the day, during the period of working and sweating, is usually about two-thirds of the amount of sweat lost; the deficit is made up at night when food is taken.

In other experiments, 0·2 per cent. NaCl, or glucose (25 gm. per hour) dissolved in water, was given in amounts equal to the amounts of sweat lost. In neither case was performance better than when water alone was given. Nor was any advantage found from giving yeast, 200 mgm. of ascorbic acid, 20 mgm. of thiamin, or 20 mgm. of riboflavin, whether singly or together, either during work or the day before.

[This work is very relevant to a question that arises from time to time —namely, whether men can be trained to do without water for hours on end in a hot climate, *e.g.*, to go all day without drinking. These experiments show that in severe conditions, if performance is to be maintained, water must be taken *from hour to hour*, as fast as it is lost. Provided the overall intake of salt, food, and vitamins, is adequate, water is all that is necessary to prevent rapid deterioration—which must, therefore, be solely due to water loss. Since at high temperatures the rate of sweating cannot be reduced without risking other dangers, it is difficult to see how any acclimatization is possible.

Even if the body could accumulate reserve stores of water, when the rate of sweating was a litre or more per hour, these stores would be rapidly exhausted. In the face of this and other recent physiological evidence, it would seem that the old tradition of mountaineers and athletes, that it is a bad thing to drink on the march, is probably founded on psychological grounds, and is certainly not applicable to work in the tropics.] *J. Waterlow.*

PETERS, J. P. **Water Exchange.** *Physiol. Rev.* 1944, Oct., v. 24, No. 4, 491–531. [458 refs.]

The main subjects treated in this review are as follows :—

(1) Membrane equilibria and transfers of water within the body. This includes methods of measurement of blood volume, extracellular fluid volume, and total body water, with some discussion of the results obtained by different workers.

(2) Exchanges of water with the environment. Under this heading come thirst, water exchanges in the alimentary canal, loss of water by sweating and insensible perspiration, and metabolic measurements of water balance.

(3) Regulation of the body fluids by the kidneys.

(4) The action of endocrine glands. This section is devoted mainly to diabetes insipidus and adrenal cortical insufficiency.

(5) The effects of diet, water, and salts—their deprivation and excess.

J. Waterlow.

MASON, Eleanor D. **Daily Measurements of Basal Metabolism, Body Temperature and Pulse Rate during a Journey to the Tropics.** *Indian J. Med. Res.* 1944, May, v. 32, No. 1, 27–30, 1 graph.

Daily measurements of basal metabolic rate, pulse-rate, and temperature were made by the author on herself in the course of a six weeks' voyage from San Francisco to Madras. The transition from temperate to tropical conditions was abrupt. For the first two days after this, both basal metabolism and mouth temperature rose slightly. From the third day the metabolic rate began to fall, and after a week in the tropics was 10 per cent. lower than the average rate for that subject in a temperate climate. During the second week it fell slightly more. The mouth temperature regained its original level.

These findings confirm previous work by the same author, in which she showed that some, but not all, people had a basal metabolic rate about 10 per cent. lower in the tropics than in a cool country. They suggest that a fall in heat

production plays a part in adaptation to high environmental temperatures. Because, as the present paper shows, the change is a relatively slow one, and is not established for several days, it is attributed to a reduction in activity of the thyroid gland.

These observations and deductions are in close agreement with those of Sir Charles MARTIN, who measured his own B.M.R. during a journey through the tropics in 1930.

[One objection has been made to Martin's conclusions, and is applicable to the work reported here: it is that the fall in B.M.R. is due to that well-known effect of a warm atmosphere—the tendency to go to sleep, which leads to a greater degree of muscular relaxation. This criticism implies that the measurements in the tropics are more truly basal. It could to some extent be answered by taking care that the temperature of the room in which the measurements were made was always the same. The temperatures given in this paper were not, however, taken in the cabin but from the ship's records. Since the basal metabolic rate is a value which is artificial, in the sense that it is defined entirely by the conditions of measurement, data of this kind will always be difficult to interpret.] *J. Waterlow.*

TROPICAL ULCER.

CONNELL, W. K. [**The Treatment of Ulcers by Plaster Casts.**] [Correspondence.] *E. African Med. J.* 1944, Aug., v. 21, No. 8, 255.

The author points out that the method of treating ulcers by plaster casts, given in a recent paper by IRVINE [this *Bulletin*, 1944, v. 41, 878] is precisely that which was introduced by CONNELL and BUCHANAN [see this *Bulletin*, 1934, v. 31, 337] except that in some cases Irvine dusted the ulcer with sulphonamide powder before applying the "Zipp" and plaster of Paris. An editorial note states that Irvine apologizes for his omission to refer to Connell and Buchanan's work of which he was unaware.

Connell also refers to the description of "Zipp" given in Martindale's Extra Pharmacopoeia, 22nd Ed. 1941, where a reference is made to a paper by DALE [see this *Bulletin*, 1936, v. 33, 630] but not to Connell and Buchanan's original paper. [Dale's paper shows that he also was unaware of the previous work; "Zipp" was devised in 1931 by Connell and Buchanan who gave it its name, see this *Bulletin*, 1940, v. 37, 813.] *J. F. Corson.*

FEINMAN, M. H. **Tropical Ulcer.** *New England J. of Med.* 1944, Oct., 26, v. 231, No. 17, 578–81, 4 figs.

A general account.

GENERAL PROTOZOOLOGY.

HOGUE, M. J. **The Behavior of *Trichomonas vaginalis* in a Semi-Solid Medium.** *Amer. J. Trop. Med.* 1944, July, v. 24, No. 4, 255–8, 6 figs.

Grown in a semi-solid medium *Trichomonas vaginalis* was seen to throw out a long pseudopodium at the distal end of which were the various structures of

the flagellate—flagella, axostyle, membrane, etc. The pseudopodium, which was actively motile, could be withdrawn and again protruded. After 48 hours in the medium the pseudopodium had lost its power of withdrawal, though this was sometimes effected after the addition of Ringer's fluid. Finally these elongate forms appeared to degenerate. [It seems as if this phenomenon may be an attempt to separate a portion of redundant cytoplasm, as occurs commonly in trichomonads of the caecum of rodents.] *C. M. Wenyon.*

GREENSLADE, C. M. & MORRISON, Daphne. *Trichomonas vaginalis* **Infestation.** *New Zealand Med. J.* 1944, Aug., v. 43, No. 236, 168–71, 1 fig.

GENERAL ENTOMOLOGY.

OZBURN, R. H. **Problems of Medical Entomology of Military Importance in Canada.** *J. Econom. Entom.* 1944, Aug., v. 37, No. 4, 455–9.

McCOY, O. R. **Relation of Insects to the Health of Military Personnel.** *Ibid.* 459–64.

HARDENBERGH, W. A. **Entomologists and the Sanitary Corps.** *Ibid.* 465–7.

FREEBORN, S. B. **The Malaria Control Program of the U.S. Public Health Service.** *Ibid.* 467–9.

CARPENTER, S. J. **Insect Control at Army Training Camps.** *Ibid.* 470–74.

BRADLEY, G. H. **Entomological Services on the Program for Malaria Control in War Areas.** *Ibid.* 475–7.

ANIGSTEIN, L. **Review of certain Communicable Diseases in Texas transmitted by Arthropods.** *Texas Reports on Biol. & Med.* 1944, v. 2, No. 3, 267–92, 6 charts & 4 maps. [15 refs.]

BARBER, M. A. **The Rearing of Sterile Adult** *Anopheles. Pub. Health Rep.* Wash. 1944, Oct. 20, v. 59, No. 42, 1384–7.

HENRARD, C., VAN WYMEERSCH, H. & WANSON, M. Description de la larve et de la nymphe de l'*Anopheles dureni* Edw. [**The Larva and Nymph of** *A. dureni.*] *East. African Med. J.* 1944, Sept., v. 21, No. 9, 266–9, 1 pl. facing p. 272.

DAVID, W. A. L., BRACEY, P. & HARVEY, A. **Equipment and Method employed in Breeding** *Aëdes aegypti, L.*, **for the Biological Assay of Insecticides.** *Bull. Entom. Res.* 1944, Nov., v. 35, Pt. 3, 227–30.

For the biological assay of insecticides it is necessary to rear the test insects in large numbers under standard conditions of temperature and humidity and on a standard diet. The authors describe a simple arrangement for keeping the small insectary ($5 \times 5 \times 7$ ft. high) at a temperature of 28°C.$\pm$1°C. and a humidity of 70 per cent. R.H.$\pm$2 per cent. Fan, hair-hygrometer with electrical contacts, mercury-toluene regulator, water bath with immersion heater, and air heater are all mounted on a board 3 ft.$\times$1 ft. The larvae are reared on an infusion of bread-crumbs prepared by mixing these in constant proportions in a 2-litre winchester bottle with 0·05 per cent. sodium chloride solution, and storing for five days at 20°C. After emergence the adult mosquitoes are kept for one to four days on a diet of sugar, raisins and water before being used for the spraying tests. The paper contains many practical details of technique.

V. B. Wigglesworth.

BLAGOVESHCHENSKIĬ, D. I. BREGETOVA, N. G. & MONCHADSKIĬ, A. S. [**Activity in Mosquito Attacks under Natural Conditions and its Diurnal Periodicity.**] *Zool Zh.* Moscow. 1943, v. 22, No. 3, 138–53, 3 graphs. [In Russian. English summary.]

An abstract of this paper is published in *Rev. Applied Entom.* Ser. B. 1944, Nov., v. 32, Pt. 11, 214.

HOPKINS, G. H. E. **Notes on Myiasis especially in Uganda.** *East African Med. J.* 1944, Sept., v. 21, No. 9, 258–65. [16 refs.]

The author records a number of cases of human myiasis from Uganda, with particulars of the species of fly responsible.

The classification of myiasis (which is not solely a matter either of entomology or of pathology) has been unsatisfactory. The author propounds a system based mainly on the organ attacked (*e.g.* " gastro-intestinal myiasis "), but including the new term " lesionary myiasis " for infestations occurring partly at least in diseased tissues, on or near the surface of any region of the body. He points out that there are two subdivisions of this ; in the one the larvae are limited entirely to diseased or damaged tissues, in the other they extend also into those which are healthy.

Among the Uganda records it is interesting to see a case, apparently the first ever recorded, of infestation of man by maggots of *Chrysomyia inclinata* ; they occurred in a burn. *Chrysomyia bezziana*, which so frequently causes lesionary myiasis of man and animals in India, has never been recorded from human beings in Africa though common in domestic animals in some areas : three human cases are here recorded. *P. A. Buxton.*

ISOLA, W. & OSIMANI, J. J. Un nuevo caso de oftalmomiasis conjuntival producida por *Oestrus ovis* L. en el Uruguay. [**A Case of Conjunctival Myiasis Due to *Oestrus ovis* in Uruguay.**] *Arch. Uruguayos de Med., Cirug. y Especialidades.* 1944, Sept., v. 25, No. 3, 260–64, 1 fig. [12 refs.] English summary.

VARGAS, L. Nombres y datos nuevos de simulidos del nuevo mundo. [**New-World Simuliidae.**] Reprinted from *Rev. Soc. Mexicana de Historia Natural.* 1943, Dec., v. 4, Nos. 3–4, 135–46, 7 figs. on 2 pls. [37 refs.] English summary.

KHOKHLOVA-BUYANOVA, O. F. [**On the Reaction of Phlebotomus to Different Stimuli in relation to its Distribution in Houses.**] *Zool. Zh.* Moscow. 1943, v. 22, No. 2, 67–72. [In Russian. English summary.] Summary taken from *Rev. Applied Entom.* Ser. B. 1944, Nov., v. 32, Pt. 11, 213–14.]

Laboratory experiments similar to those of Polezhaev with mosquitos were carried out in the summer of 1939 in Sebastopol to ascertain the effect of light on *Phlebotomus papatasii*, Scop. When sandflies in a transparent cage were disturbed, they all flew immediately towards the wall that was illuminated (796 lux), but soon settled on other walls as well, though about 40 per cent. were still on the illuminated wall after 10 minutes. If sandflies were disturbed when the cage was between a window and an electric lamp producing illuminations of 190 and 145 lux, respectively, on the walls, they always flew first towards the window, but again soon distributed themselves evenly over all the walls. The initial flight towards the window occurred even if the illumination of the wall

nearest it was reduced to 48 lux, and that of the wall nearest to the electric light was increased to 500 lux, which showed that sandflies, like mosquitos, are more attracted by a large illuminated surface than by a small though brighter light.

In another series of experiments, fully fed females or hungry ones that had completed digestion were placed in a plywood box painted black on the inside, in which the front wall was replaced by a translucent screen through which light of various intensities was admitted. In some cases, the screen consisted of adhesive paper so that sandflies alighting on it were caught. The sandflies were disturbed in darkness five minutes before the box was illuminated and then exposed to light for five minutes. Most of them settled on the wall opposite the translucent screen, which was lighter than the other walls, but the fed females did not react in this way unless the intensity of light on this wall was at least 27 lux, whereas the hungry ones did so when it was only 5 lux. It is thought probable that this back wall functioned as a second light screen, and that the sandflies alighted more readily on it than on the smoother surface of the screen that admitted the light. The numbers of the sandflies caught on the adhesive paper were little greater than in a control experiment in which the box was not illuminated, but were greater in hungry than in fed females, showing that positive phototaxis in the reaction of escape is more sharply defined in the former.

Observations in inhabited houses showed that differences in light intensity do not affect the selection by sandflies of places in which to rest during the day, provided that the intensity is not greater than 336 lux. From these observations and others in insectaries, it is concluded that sandflies are negatively geotactic and, to a less extent, positively thigmotactic, as they usually settle near the ceiling and tend to congregate close together in corners and to hide in cracks.

Sandflies entering inhabited rooms through open windows were caught on an adhesive screen fixed in the centre of each window and also on strips of adhesive paper round the edges of the frame, showing that some fly in directly and others alight when entering. Twice as many males were caught as females, and twice as many hungry females as engorged ones.

VANDERPLANK, F. L. **Apparent Densities of certain African Blood-Sucking Insects (Diptera).** Reprinted from *Proc. Roy. Entom. Soc. of London.* Ser. A. 1944, June 22, v. 19, Pts. 4–6, 68–72.

FEDER, I. A. **Tick Bite Pyrexia.** *J. Amer. Med. Ass.* 1944, Sept. 30, v. 126, No. 5, 293–4.

During military manoeuvres in Tennessee, U.S.A., in May and June 1943, some patients were admitted to hospital with fever with associated headache and anorexia and, occasionally, vomiting and abdominal pain. Ticks were found attached to the skin and their removal was followed by complete recovery within 12 to 36 hours. No cause of the illness could be found and the author presumes that it was due to a toxin or venom secreted by the female tick [the species of tick is not mentioned]. *J. F. Corson.*

EWING, H. E. **Note on Taxonomy of Type Species of the Mite Genus Trombicula Berlese.** *U.S. Nav. Med. Bull.* 1944, Oct., v. 43, No. 4, 837–9, 1 fig.

LABORATORY PROCEDURES.

WITLIN, B. **Self-Buffering Staining Solutions. With special reference to Wright's Polychrome Methylene Blue-Eosin Stain.** *J. Lab. & Clin. Med.* 1944, Oct., v. 29, No. 10, 1,097–9, 1 fig.

Wright's stain [Romanowsky] was buffered with sodium acetate and acetic acid by the following method : 120 mgm. of sodium acetate were dissolved in 100 cc. of methyl alcohol ; to this was added 0·4 cc. of a 1 per cent. solution of glacial acetic acid in methyl alcohol. Wright's stain was dissolved in this solution in the proportion of 0·1 gm. of stain to 60 cc. of solution, filtering after 24 hours.

Blood films were stained by adding 15 drops (0·35 cc.) of the staining solution, allowing it to act for two minutes, then adding 15 drops (0·75 cc.) of distilled water, leaving the mixture for three minutes. The stain was tested at monthly intervals over three years and the results were excellent. *J. F. Corson.*

GRAU, Marguerite L. **A Simple Acid Water Solution for Better Visualization of Malarial Parasites using Wright's Stain for Thick Blood Films.** *J. Lab. & Clin. Med.* 1944, Oct., v. 29, No. 10, 1103.

Wright's stain, as ordinarily used, has been found less suitable than Giemsa's stain for malaria parasites in thick blood films ; the author has obtained satisfactory staining by first haemolysing the red cells with a fixing solution and then diluting the stain with acid water. The method is as follows :

Fixing solution. 1 per cent. glacial acetic acid in 5 per cent. formalin.

Acid water. N/10 HCl. 0·06 cc. (2 drops) in distilled water 100 cc.

Place in the fixing solution for 10 minutes, wash in 2 changes of distilled water, each for five minutes, and dry ; add Wright's stain, one minute ; add an equal amount of acid water and leave for 10 minutes ; wash with acid water and dry.

Ring forms, schizonts and gametocytes are distinctly shown. *J. F. Corson.*

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS.

BURKE, E. **Some Medical Problems of Wartime Tea Estate Practice in Assam.** *Proc. Ann. General Meeting of Assam & Northern Bengal Branch Brit. Med. Ass., Shillong, 4th–7th November, 1943.* 10–22. 1944. Calcutta : Indian Tea Association.

This review of war-time medical problems of the tea industry in Assam is by a medical officer who is in medical charge of 14 estates with a combined population of 25,000.

The health conditions of the labour forces have deteriorated during the war. Food and medical supplies have been in short supply. There has been difficulty in getting building material for new coolie houses ; many existing houses are unfit for habitation. Clothing is scarce and expensive. Fuel supplies have been difficult ; wood formerly available for coolies is now used in factories owing to the shortage of coal ; cooking suffers.

Malaria has increased. In these gardens chief reliance has been laid on mass quinine prophylaxis, with the result that the spleen rate was reduced from 62 in 1930 to 18 in 1940. Quinine prophylaxis had to be suspended in 1941; the spleen rate in 1942 was 23. A still further increase in malaria incidence was noted in 1943. There had been an influx of many new coolies with new strains of malaria. Local "busti" (village)-acquired malaria has greatly increased in the Mangaldai District.

There were 3,756 cases of diarrhoea in the first eight months of 1943, more than double the total incidence of any previous year. There were also 1,241 cases of dysentery in the same period; 700 was the previous highest annual total. Children were the chief sufferers. The case mortality rates were—diarrhoea 2·7 and dysentery 12·1 per cent.

Anaemia and dropsy have been more prevalent than usual. For this the hookworm has not been chiefly responsible. Bad food and unsuitable food in an underfed and debilitated population have contributed most.

Cerebrospinal meningitis which had not been seen during the previous 17 years made its appearance in 1943. There were 12 cases with two deaths and 10 carriers. Sulphapyridine "worked wonders."

A recrudescence of kala azar in long-quiescent areas has been observed. The gardens suffering most are those near infected *bustis*. There has been more local recruiting from *bustis* than usual, the villagers being more keen to work in gardens than in more prosperous days: infection follows. Acute fatal cases of kala azar and family infections have been more in evidence than in any year since 1928.

The depressing story is relieved by the facts that there has been no increased prevalence of tuberculosis, pneumonia, bronchopneumonia, Naga sores [tropical ulcers] or ophthalmia, and that drunkenness, venereal diseases and the opium habit have almost disappeared since the war began.

The mental and physical strain imposed on Europeans by war conditions has been great. Neurasthenia, especially among women, has markedly increased. It has become increasingly evident that regular home leave is essential to maintain all-round bodily and mental efficiency.

With regard to malnutrition it is stated that army requirements have been partly responsible for the shortage of rice. Milk, beef, mutton, vegetables, poultry and eggs have all been scarce and costly. The fish brought long distances is sold in bazaars in bad condition. In spite of the Indian Tea Association's food concession scheme the labour population is badly fed. In the first eight months of 1933 there were 693 marked cases of avitaminosis, of which 85 were fatal. Children suffered most. Lactation often fails from undernourishment.

Hitherto, hospitalization has predominated in tea-garden medical practice. There is great need for more preventive work. Health education is a real need. *Norman White.*

Le Gall, R. Vue d'ensemble sur les maladies pestilentielles, endémo-épidémiques, transmissibles et sociales à Madagascar entre 1936 et 1940. [**Transmissible and Social Diseases in Madagascar, 1936–40.**] *Bull. Office Internat. d'Hyg. Publique* 1943, Sept.–Oct., v. 35, No. 9–10, 417–50, 4 maps & 1 chart.

Bull. Inst. Hyg. Maroc. 1943, v. 3, 123–87. Rapport sur l'activité des Services de la Direction de la Santé Publique et de la famille pendant l'année 1943. [**Report on the Public Health Services of Morocco for 1943.**]

Bull. Inst. Hyg. Maroc. 1943, v. 3, 189–93. Rapport sur l'activité de l'Institut d'Hygiène pendant l'année 1943. [**Report of the Institute of Hygiene of Morocco for 1943.**]

BULL. INST. HYG. MAROC. 1943, v. 3, 194–7. Rapport sur l'activité du Service central de l'hygiène scolaire en 1943. [**Report of the School Medical Service of Morocco for 1943.**]

LAWES, C. H. W. & KEON-COHEN, B. T. **Papuan Interlude.** *Med. J. Australia.* 1944. Sept. 30, v. 2, No. 14, 354–9, 8 figs.

BOOK REVIEW.

WAR DEPARTMENT, Washington. **Technical Manual. Emergency Food Plants and Poisonous Plants of the Islands of the Pacific. April 15, 1943 (TM 10–420)** [MERRILL, E.D.] pp. v.+149, 113 figs. 1943. Washington: Supt. of Documents, U.S. Govt. Printing Office.

This pocket-sized booklet contains short descriptions and drawings of over a hundred plants and trees which grow in the South Pacific islands, the Malay Peninsula, the Philippines, Indo-China, Thailand, Burma and eastern India. It is intended to help the soldier, sailor or airman who has become isolated from his unit and has to live on the country. Familiar vegetables and fruits are not included. The botanical and common names, as well as many local native names are given. The greater part of the book refers to food plants, but there is a section on poisonous plants and a few pages deal with plants used for stupefying fish. The value of local native knowledge is emphasized and native help should be fully used. With such assistance this book should be very useful in enabling the stranger to become familiar with many valuable food plants and some harmful ones. *J. F. Corson.*

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